The Board of Ordnance and small arms supply : the ordnance system 1714-1783.

Bailey, De Witt

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ABSTRACT

Throughout its entire history the Board of Ordnance was forced to rely upon the civilian gun trade for its supplies of small arms, with foreign purchase to supplement domestic output when necessary. Until Britain's greatly increased military commitments under William III this reliance proved reasonably satisfactory, but the chaotic conditions which developed during the long War of the Spanish Succession (1702-13) brought realization that a new, more contralized, system of control and inspection was required.

Between about 1710 and 1730 there was created by the Board of Ordnance a new system involving the use of selected highly skilled and reliable workmen from the gun trade chosen by the Board, and not the Gunmakers Company as previously, and agreed patterns developed by the Board. The sequence of production was also changed, and, instead of supplying completely finished arms, some contractors now supplied the several component parts (locks, barrels, furniture, smallwork and stocks) which were inspected during manufacture and then delivered into Ordnance storehouses from whence they were issued by the Board to other contractors for making into complete arms. This new system has been described as 'the Ordnance System' to emphasize the new, Ordnance-centred focus of the operation.

The new system came into full operation from the late 1720s, and was expanded satisfactorily to meet the needs of the Wars of 1739-48. The system operated most successfully during the Seven Years' War, producing a more than adequate quantity of a wide variety of arms with a minimum of foreign purchase. Between 1763 and 1775 a variety of new arms for the various branches of the service, and a new standard arm for the line infantry was introduced and production proceeded within the Ordnance System.

During the American Rebellion the system began to break down in the face of labour problems, bad timing, excessive demands and a finite workforce. Government requirements were achieved only by making a number of expedient alterations to the system. By the end of the war it was clear that future Ordnance production demanded a new approach to achieve any increase in requirements.

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A work of this size and scope inevitably requires the goodwill and active cooperation of many people, even though the author performs the hard labour and ultimately gets the credit (or otherwise). I have always made it a point to firmly acknowledge all those who have helped me in any way towards the preparation of a literary work, and this one is no exception.

My inspiration came first and foremost from Howard L. Blackmore, who has always given me every encouragement and assistance, and to whom I shall always be grateful for everything he has done for me.

The staff of the Public Record Office at Kew and Chancery Lane have been unfailingly helpful in providing the raw materials from which almost all of the present work has been constructed.

To Guy Wilson and Graeme Rimer of the Royal Armouries, H.M. Tower of London, and to Jay Gaynor of Colonial Williamsburg, who made it possible for me to work and catalogue in their collections of British military firearms, without which experience no really valuable conclusions could have been drawn in this work, my sincerest gratitude.

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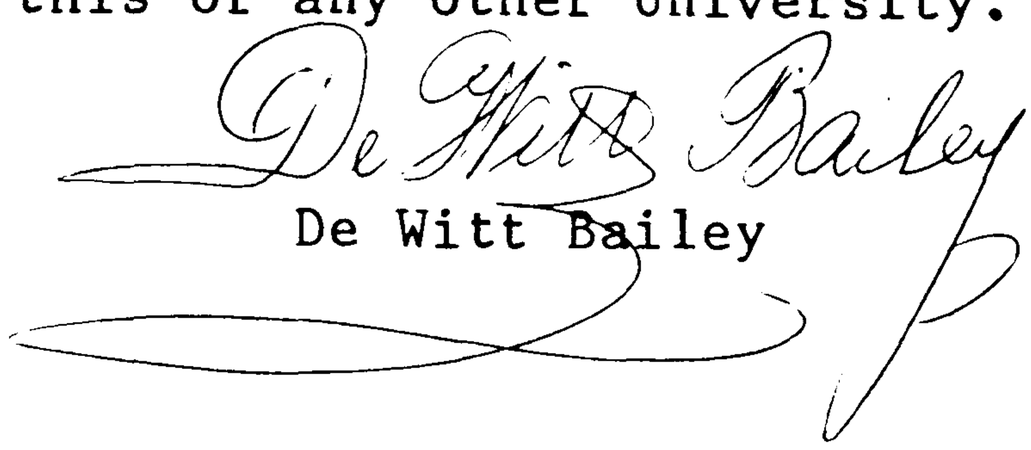
To each of these people and staffs, my very warmest gratitude for all they have, each in their own way, done towards helping me to produce this paper.

I certify that the work done in this thesis is my own, except as noted, and has not been previously submitted for a Degree at this or any other University.



De Witt Bailey

FOREWORD

The idea of creating a work which dealt in detail with the development, manufacture, procurement and distribution of British military small arms during the Eighteenth Century first occurred to me after reading the classic work on the subject, Howard L. Blackmore's British Military Firearms 1650-1850, which first appeared in 1961. The information contained between these covers suggested that there was much more of the same available. Subsequent conversations with Mr. Blackmore over the years revealed that the attitude of the publisher and their assessment of the market at the time he submitted his manuscript had resulted in the failure to print an entire second volume. With this realization, and with Mr. Blackmore's encouragement, I began the research which has led in recent years to the formulation of the present study, designed to give as complete a history as the records will allow of the interacting network of people and processes which produced small arms for the Board of Ordnance during the years when a particularly Ordnance-focused modus operandii was employed by the Board to achieve this production.

This work is not intended to be a either a socio-economic or an administrative study of the Board of Ordnance and War Office, nor is it designed as an examination of the political structure or the strategic significance of the Board within the framework of Eighteenth-Century British government. This administrative and organizational approach has been most ably used by H.C. Tomlinson in his thesis 'The Organization and Activities of the English Ordnance Office, 1660-1714' (University of Reading, 1974) and its published version 'Guns and Government: The Ordnance Office under the later Stuarts' (London, 1979). These aspects of the Board have been touched upon in the present work only insofar as they relate to a clearer understanding of the role played by the Board and its various officers and employees in the

operation of that part of the Board's functions concerning the supply of small arms. These processes include design, procurement of components, manufacture, inspection, storage, maintenance and issue of military firearms.

The questions which will be dealt with in this study include the following: what types of small arms did the Board of Ordnance acquire, and by what particular means; who made the arms, and how were they made; how did the Ordnance methods of manufacture differ from those employed by the civilian gun trade in making arms for commercial sale; to whom were the Board's arms issued, for what reasons, and by what means. The procedures and techniques applied to each process from the decision to acquire or manufacture arms, to the final disposal of the arms from Crown ownership will be examined. Within this context both administrative and manufacturing processes will come under scrutiny so far as the documents and examples of arms will permit. My own broader involvement with the history and use of antique firearms, and the study of their manufacture, for more than thirty-five years, enables me to place the manufacturing system used by the Ordnance in the wider sphere of the civilian guntrade of the period, and the essential interaction of the Board with the civilian trade will be demonstrated.

The system with which we shall be dealing amounted to the governmental administration of a segment of a pre-existing civilian craft industry, not the operation of a self-contained government department. Almost every activity of the Board across its wide spectrum of responsibilities was based on the hire by contract of existing private-sector facilities. Small arms were not manufactured within the Tower by Small Gun Office workmen in other than pattern quantities until the period 1804-15, and no permanent large-scale Government gun factory came into operation until just after the Crimean War and the end of the Board itself. During our period there was no desire on the part of the Board to operate its own gunmaking facilities, and no mention of it in the existing

documentation, and Parliament would never have granted the funds required for such a comprehensive function when apparently adequate facilities already existed in the 'private sector.' It was an age of private enterprise, and also one of fragmented, departmentalized, largely ad hoc governmental activity. This aspect of the Board's operation and its place in the overall governmental contribution has been brilliantly examined by C. Richard Middleton, and although his study focuses on the mid-Century, the records suggest that his conclusions apply to a far wider period.[1]

So much of policy making and decision taking was done verbally by those participating in Eighteenth Century government that the modern historian if often left with what would now be considered as 'gaps in the records' but which, in fact, never existed at all in the documentary evolution of any given event. This factor, in addition to the actual gaps in centuries old records, does leave the historian of the Eighteenth Century with a situation in which the answers to some questions can only be derived from later, often indirect, evidence. So it is with the activities of the Board of Ordnance, especially where some operation is initiated, or a design introduced or changed:generally we must work backwards to discover the date of the change. Some questions cannot be answered from the records, or from examination of examples of the arms themselves, and these are best left as questions in the absence of other than late Twentieth Century criteria to work with. Fortunately there are few of these problems, and the Ordnance records are, with specific exceptions, very complete.

In a study which involves the use of both documents and artifacts, it is impossible to achieve a balanced view, and often impossible indeed to achieve a correct conclusion, without making use of both types of evidence. This was made strikingly clear to me when, after more than two years of organizing the documentary materials, in conjunction with access to various public and private

collections of British military small-arms in this country and abroad, I was offered the chance of cataloguing the collection of British military small-arms at Colonial Williamsburg, in Virginia, U.S.A. Unlike any of the collections in England or Europe, not excepting the Tower of London's Royal Armouries, the Williamsburg collection contains several or many examples of a single type of arm. When these are closely examined and compared with the evidence in the documents, it is possible to draw a number of vital conclusions about the design and production methods which were quite impossible prior to such an examination. Although the documents do not suggest it, the products of the Board's system of manufacture reflect a far greater degree of unity, similarity, and precision than could be concluded from seeing only single examples. The results for this particular study are contained in the Conclusion.

1. Middleton, C. Richard. 'The Administration of Newcastle and Pitt: the Departments of State and the conduct of the War, 1754-1760, with particular reference to the campaigns in North America.' Ph.D., University of Exeter, 1968.

A NOTE ON THE SOURCES

Five broad categories of manuscript primary source materials have been used to construct this study. In the order of their importance and frequency of use, they are: War Office, Colonial Office, State Papers, and Admiralty Papers all from the Public Record Office (PRO), and the Additional Manuscripts (Add. Mss.) collections at the British Library (BL).

The text of this study is based largely upon the Minute Books of the Board of Ordnance, specifically on the copy made for the Surveyor General, which are in the Public Record Office at Kew under the classification of War Office (WO) 47. These provide what little information there is on the origins of small arms development, and on the day to day operation of the Office and its numerous officials. Additional information on these areas is also found in the Treasurer of the Ordnance's Ledgers (WO 48), which often add details to a brief mention in the Minutes, and also give information on the periods of employment and salaries of various Office employees. Unfortunately there are gaps in the Minutes, particularly between 1720 and 1749, and what information is available for that period comes from the Bill Books (WO 51) and the Warrant Books (WO 55). These latter two sources, along with the Treasurer's Ledgers and the Small Arms Books (WO 50) (which cover the years up to 1729 during which time small arms were billed separately from other Ordnance indebtedness), are also the foundations for the meagre descriptions and production figures of the various types of small arms.

Pagination in these volumes is often absent or confusing, since many of them have later been given a separate set of numbers, sometimes for folios and sometimes for pages. I have stayed with the series representing pagination as far as possible, and where confusion exists I have used only the relevant date for the entry which is always close enough to enable the

reference to be located with a minimum of effort. While many of the volumes have indexes, these, as with most indexes where one is searching for firearms references, have been found unreliable; I have always searched a volume page by page rather than rely upon an index. Not only has this practise proved more time consuming, but it has also, on occasion, produced unexpected information.

Standards of book keeping and office administration in Eighteenth-Century goverment offices were extremely haphazard and imprecise, even though a 'system' may have been laid down. A vast amount of information was conveyed verbally and/or noted on scraps of paper or in temporary notebooks which were thrown away when filled and dealt with. A bevy of clerks in various offices were put to entering whatever was required on the day, and the result is that each of the above categories of books contain information which one would not expect to find in that particular class of volume. There is considerable correspondence in the Warrant Books; the Minutes contain details on production, technical details, and tables; the Treasurer's Ledgers often record technical details not given in the Bill Books. In order to arrive at any complete coverage of a period or a production analysis it is therefore necessary to examine the entire spectrum of volumes, extract all relevant information, and then sift it all and see what is present and what is lacking. In the case of each of the major wars (1740-48, 1755-63, 1775-83) I have been through the books at least twice and in most cases as many as four times, because the imprecise nature of notation and description has often made it impossible to recognize a statement as relevant until other pieces of the puzzle have fallen into place. These other pieces often appear many years later in the records than the time at which the event took place for which one is looking. To look up a specific event in terms of date is possible only in the Minutes; and these contain the least amount of technical details and personnel references. With regard to the Bill Books, these are especially difficult since there

are many volumes for any given year, particularly during wartime. There are, for instance, thirty-seven volumes for the years of the War of Jenkins' Ear and the Austrian Succession (1739-1748), forty-four volumes covering the Seven Years' War (1755-1763), and forty-nine volumes for the American Rebellion (1775-1783).

The most distressing discovery made in the course of researching for this study was a single folder at the Public Record Office, WO 44/304: 'Weeding of Ordnance papers and books- lists 1834-5.' This contains correspondence and lists from various Ordnance clerks working in the 1830s, relating to the examination of masses of old Ordnance records which were being evaluated for possible disposal. Among the items listed for destruction were the following:

Journals of Receipts and Issues, 1642-1766: 2026 books.
Artificers Warrant Books 1665-1778: 34 books.
Day Books: 120 books.
Bills Received in the Clerk of the Ordnance Office, 1761-1773: 9 books.
Quarterly Bills of Artificers, Work done at the Tower, 1723-1728: 1 book.
Proof Book 1714-1733: 1 book.
Accounts and Vouchers of Stores received and issued at the Outports, 1718-1776: 200 books.
Entries of Bills 1648-1780: 33 books.

What might have been learned from these volumes is, simply, incalculable. The items listed above relate only to our period, there were many more of earlier and later date.

This study attempts to deal as much with the arms themselves, their identification and physical description, as with their manufacture, and this has required the recognition and actual handling and examination of as many pieces from the period as possible. The chief source in Great Britain has been the collections of the Royal Armouries at H.M. Tower of London; but these collections, while containing several examples which are the only ones identified to date, as well as a wide spectrum of the types of arms produced for the Ordnance, lack a vital characteristic absolutely necessary for almost all

positive identification: bulk. To look at a single example may suggest tentative identification on the basis of the very vague general features mentioned in the written record. But the single example being referred to may well represent a failed pattern which was not produced, or one which was produced only with significant modifications. Until one is able to examine several examples of the same arm, preferably side-by-side, it is often unwise to draw any firm conclusions on the characteristics of that particular arm. It is only when seen in quantity that the broad manufacturing techniques employed can be seriously studied, and minor variations in finish delineated and seen for what they are. It was only when I discovered several of the first pattern Eliott carbines in the Royal Collection at Windsor Castle, and more than a dozen of the Liege-made Short Land Pattern muskets on the walls of the King's Guard Chamber at Hampton Court Palace, that each of these types could be confirmed as what they were. For these reasons, the collections of the Museum of Scottish Antiquities, the Scottish United Services Museum, the Smithsonian Institution, and particularly Colonial Williamsburg, have been invaluable in supplementing the single specimens of the Tower collections, allowing confirmation and study of the various patterns in adequate numbers. Without the Williamsburg collections it would have bene impossible to observe at first-hand and assess the significance of the changes which clearly occurred between several of the mid-century periods of musket production which, taken in conjunction with the documentary evidence, make it clear that Ordnance production was far more organized and systematic than had been thought previously. Indeed, it was on the basis of these examinations and the establishment of clear differences between the various periods that I have felt justified in putting forward specific pattern date-designations for the main lines of musket production.

For ease of reference the chief documentary sources used are listed below. Where only a part of the period is covered, the dates are given, otherwise they include the entire period:

ADM 1/4001-4013. Letters from the Ordnance Office.

CO 5. America. Original correspondence with the Secretaries of State.

SP 41. Domestic, Military. Papers from War Office and Board of Ordnance to Secretary of State.

SP 77. Foreign. Flanders.

WO 1. War Office. In-Letters, 1755-1783.

WO 3. War Office. Out-Letters.

WO 46. Out-Letters from the Master General, Board and Commander-in-Chief, General.

WO 47. Minutes of the Board of Ordnance, 1714-1722; 1724-6; 1749-1783.

WO 48. Ordnance Treasurer's Ledgers.

WO 49/234. Imprest Book, 1729.

WO 49/238. Entry Book of Bills, 1742-6.

WO 50. Small Arms (Bill) Books, 1709-29.

WO 51. Bill Books 1715-1783.

WO 55. Reports, 1753-83.

WO 55. King's and Board of Ordnance Warrants.

GLOSSARY OF TERMS

Words in UPPER CASE letters within an article are themselves separately defined elsewhere in the Glossary. Definitions have been worded to make clear the usage applied by the Ordnance, and they may vary accordingly from the pure dictionary definition.

B.

BARREL. The forged iron tube which forms the basis of the small arm, containing the propellant charge and projectile.

BAYONET. An attenuated version of the pike designed for use with longarms, introduced in the British army during the 1670s in the form of a 'plug bayonet' whose blade had a tapered wooden handle which was pushed into the muzzle of the barrel. By the start of our period the 'socket bayonet' was in common use and became a standard accompaniment to the musket from 1722. Blades varied in length from 9" for some carbines, to 17" for the standard musket, and were normally triangular in section although flat, double-edged blades were in use during the 1720-1750 period. The socket of the bayonet had a zig-zag slot cut into it, by which the bayonet was fixed on the SIGHT near the muzzle of the barrel.

BORE (= Calibre). The inside diameter of the barrel. Usage in the Eighteenth Century focused on the ball size rather than the barrel diameter as is done today. It was defined as the internal diameter measured by the number of balls of that diameter in a pound of pure lead. 'Musquet bore' meant a bore size which would accept a ball of a certain diameter plus an amount of WINDAGE; in our period this translates as an actual bore size of .76", with a ball diameter of .693", normally referred to as a bore of 14 or 14½ to the pound. There were four standard bore sizes for small arms used by the Board during our period: wall piece (6¾ to the lb) musket bore (14 to the lb. or 14½ from 1753), carbine bore (20 to the lb), and pistol bore (34 to the lb). These correspond to contemporary measurements of .690" and .693", .615", and .517", being the ball size, not the diameter of the barrels, which were, respectively, .76", .65" and .56".

BREECH. The rear section of the barrel.

BREECHPLUG. An iron plug threaded at its forward end which screws into the breech of the barrel to close it. It has a flat strap extending backwards from its

upper section, with a hole drilled to take the Breech-Pin or Barrel Tang Screw, which secures the rear of the BARREL to the STOCK.

BRIDLE. (Tumbler Bridle, Pan Bridle). Support pieces on the LOCK. The Tumbler Bridle supports the TUMBLER spindle against sideways movement, and helps to keep the tumbler in line with the nose of the SEAR, by supporting the Sear Screw. The Pan Bridle is integral with the outer edge of the PAN,which extends forward and supports the Hammer Pivot Screw at its outer extremity, as well as the action of the HAMMER itself. The use or non-use of bridles gave rise to three descriptions of LOCK, which see.

BUTT. The broad, tapering area of the STOCK lying to the rear of the GRIP (wrist, small or hand) of the stock and its termination.

BUTTPLATE (Buttcap). The metal covering to protect the rear end of the BUTT; -plate is used for longarms, -cap for handguns. In our period usually of heavy cast brass secured by two screws through the plate and a cross-pin through a lug on the underside of the tang.

C.

CALIBRE. Measurement of the inside diameter of the BARREL expressed in hundredths of an inch. See BORE.

CARBINE. An ambiguous term used to describe a lightweight arm of a smaller bore than a musket (but sometimes of musket bore) and sometimes, but not always, shorter than a musket. It cannot be used as a generic, but only as a specific term, in relation to Eighteenth Century military arms.

CARBINE BORE. .65" calibre, or 20 to the lb. See BORE.

CARTRIDGE. A means of carrying propellant and projectile as a single combined unit. In the Eighteenth Century this was achieved by rolling the ball and powder together in a cylinder of tough paper. In British service the paper was rolled around a former, the ball was inserted at one end with a layer of paper between it and the powder section, and then tied in position with twine; for a musket six drams (165 grains) of coarse powder was then poured into the rear portion of the tube, and the end twisted closed.

CASE HARDENING. A method of heat treating iron, which gives the exterior surfaces a much denser, harder composition. The longer the heating process is continued, the deeper the hardening penetrates, which may cause brittleness.

COCK. On a flintlock, the external arm fitted with JAWS at its upper end to hold the FLINT. Fitted to the square of the TUMBLER at its base by the TUMBLER SCREW. The fall of the cock against the HAMMER strikes sparks from the hammer to ignite the PRIMING CHARGE in the PAN. The term generally used for the analagous term on percussion and cartridge arms is hammer.

COCK-SCREW (Jaw-Screw). The vertical screw threaded into the lower JAW of the COCK which tightens the jaws on the FLINT. It also serves as a grip for the thumb in drawing back the cock.

COMB. Used to describe the narrow upper section of the BUTT against which the cheek rests in firing a longarm, and also for the vertical arm at the top rear of the COCK which supports the top JAW and FLINT.

E.

ESCUTCHEON. See THUMB PIECE.

F.

FEATHER-SPRING. V-spring which holds the HAMMER in either the closed or open position over the PAN. Secured to the LOCKPLATE by a small screw through a FINIAL at its lower rear extremity. Usually called the HAMMER-SPRING by the Ordnance.

FINIAL. The ornamental termination of the TRIGGER GUARD TANG, front and rear, the TAILPIPE, and the HAMMER-SPRING.

FIRELOCK. The Ordnance and army term for a flintlock MUSKET. 'Musquet' is generally used by the Board when discussing manufacture &c., and firelock when dealing with issues.

FLATS (Lock- and Sidepiece-). The flat parallel sections of the STOCK into which the LOCK and the SIDEPIECE are inletted, and which have some form of ornamental aprons or terminations throughout our period.

FLINT. A hard stone of nearly pure silica, quarried and then fashioned by chipping (known as knapping)

with special tools to the desired shape. Used in flintlock ignition system to strike sparks for igniting an external PRIMING charge. Supplied to the Ordnance in four sizes, wallpiece, musket, carbine and pistol. Throughout our period the general shape of the flint was a wedge, compared to the later platform shape. The flint was wrapped in a thin piece of leather or lead and gripped in the JAWS of the COCK, and was expected to last about twelve fires before being replaced. Until the early 1790s the Ordnance flints came from Kent and were much criticised by the army for their poor quality. The Duke of Richmond re-located the supply of flints to Suffolk in the early 1790s.

FORE-END. That part of the STOCK lying forward of the LOCK.

FORE-END CAP. A protective metal cup fitted to the upper termination of the FORE-END. See NOSE-CAP.

FULL COCK. The second notch filed into the TUMBLER, to which the COCK is drawn in order to fire the piece, where the nose of the SEAR engages until released by the TRIGGER.

FURNITURE (Mounts). Protective pieces of metal fitted to the STOCK of longarms and handguns, comprising in general (with variations in use according to type and pattern) the NOSE-CAP, PIPES, SIDEBAR, SIDE-PIECE, TRIGGER GUARD, TRIGGER PLATE, THUMB PIECE and BUTTCAP or BUTTPLATE. In our period normally of cast brass.

FUSIL (FUZEE). An ambiguous term from the French often used interchangeably with CARBINE, but more often with the intention of implying a superior quality of lightweight arm, e.g. normally 'Officer's fusil' rather than 'Officer's carbine.' In Ordnance usage fusils were always of CARBINE BORE.

G.

GRIP (Hand, Small, Wrist). The narrow, virtually circular section of the STOCK between the LOCK and SIDE-PIECE FLATS and the BUTT, gripped by the hand which will pull the TRIGGER, and often inlaid at the top with a THUMB PIECE.

H.

HALF-COCK. The first of two positions filed into the surface of the TUMBLER, to hold the COCK in a

safe position away from the face of the HAMMER but not yet in the FULL COCK position.

HAMMER. (Battery, Steel, or incorrectly, 'frizzen'). The L-shaped piece of forged iron which serves as a cover for the PAN, and whose vertical CASE HARDENED section provides a surface from which sparks are struck by the FLINT in the falling COCK. It is pivoted at its base by a transverse screw into the LOCKPLATE, and held in position, either open or closed, by the pressure of the HAMMER-SPRING or FEATHER-SPRING, which also creates resistance against the falling flint to generate sparks. It is white-hot particles of the hammer, not of the flint, which form the sparks to ignite the PRIMING.

HAMMER-SPRING. The Ordnance term favoured over FEATHER-SPRING.

HEELPLATE. Ordnance term for BUTTPLATE.

I.

IMPREST. A document granting advance payment for items to be supplied or services to be rendered.

J.

JAWS (Top, lower). Flat surfaces formed at the top of the COCK to hold the FLINT firmly in position. The lower jaw is integral with the body of the cock, and the top jaw is held parallel to the lower by the JAW-SCREW (Cock-Screw) and the COMB of the cock. Both jaws have raised teeth on their inner surfaces for a better grip on the flint-leather.

JAW-SCREW. See COCK-SCREW and last entry.

L.

LOCK. The firing mechanism of a firearm, based on the LOCKPLATE. Throughout our period the flintlock was the standard ignition system. The external parts consisted of the PAN, COCK, HAMMER and HAMMER-SPRING. The internal parts were the MAINSPRING,TUMBLER, BRIDLE, SEAR, and SEAR-SPRING, each of these having their securing screws. Ordnance locks were divided into Land Service and Sea Service, and again into Plain (without any bridle to either the tumbler or pan), Bridle [or single-bridle], with only a tumbler bridle, and Double-Bridle with both a tumbler bridle and pan bridle (from 1740). In

sizes there were Wallpiece, Musket, Carbine and Pistol locks. A further division divided locks into flat and round, with flat locks generally used for either very high quality or else for Sea Service arms, with round locks kept for the majority of regular Land Service arms.

LOCKPLATE. A plate with a flat inner surface and either a flat or slightly rounded outer surface (see LOCK) which served as a base for mounting the mechanism of the lock, and to secure that mechanism to the STOCK by the use of transverse screws or SIDE-NAILS.

LOOPS (Barrel-). Small flat iron studs or tennons dove-tailed and brazed on the underside of the BARREL, through which holes are drilled to accept the PINS and the upper SLING SWIVEL SCREW which secure the barrel in the FORE-END of the STOCK.

M.

MAINSPRING. The principal motive power of the LOCK. A large heavy V-spring fixed by a stud and screw on its upper limb to the inner surface of the LOCK-PLATE, with the tip of its lower limb bearing on the front, or toe, of the TUMBLER.

MOUNTS. See FURNITURE.

MUSKET (Musquet). A smoothbore longarm of large bore size generally defined as intended for military use. The barrel is long enough so that when a bayonet is fixed it may serve as a pike for repelling cavalry. The Ordnance defined two distinct categories, Land Service and Sea Service.

MUSKET BORE. .76" calibre, or 14 or 14½ to the lb. See BORE.

MUSKETOON (Musquettoon). A short barreled longarm with a large calibre bore, primarily intended for naval use. The barrels, either of brass or iron, were usually formed with reinforcing bands towards the MUZZLE, resembling a cannon barrel, and the muzzle was often slightly flared to assist loading. Those made for the Ordnance have heavier barrels and less flare at the muzzle than those made for the civilian trade. Very few were set up during our period, suggesting that they had a very long service life and infrequent use.

MUZZLE. The mouth, or front end of the BARREL, into which, asa muzzle-loading arm, the charge for the weapon was introduced.

N.

NAILS. An Eighteenth Century trade term for screws. Hence, breechnail = breech tang screw, sidenails = lock-screws.

NOSE BAND. A reinforcing strip of sheet brass or iron let into the extreme front end of the FORE-END on many arms until the late 1740s, replaced by the NOSE CAP from the mid-1750s.

NOSE CAP. A cast brass protective cup rivetted to the front extremity of the FORE-END on MUSKETS and CARBINES intended for BAYONETS and STEEL RAMMERS from 1755.

P.

PAN. The teaspoon-shaped receptacle forged integral on the upper edge of the LOCKPLATE to contain the PRIMING charge which ignites the main charge in the BARREL.

PAN BRIDLE. On Double Bridle LOCKS (pistols from c. 1738 and muskets from 1740) the forward extending arm on the outer edge of the PAN which supports the outer end of the HAMMER pivot screw. Not used on flat Sea Service locks.

PINS. Iron wire cut to suitable length, used to pass through LOOPS on the BARREL, PIPES, TRIGGER, TRIGGER GUARD and BUTTPLATE tangs, to retain them in the STOCK.

PIPES (Rammer). Sections of tubular cast brass, usually of a barrel shape with collars at each end, used to hold the RAMMER in position in the STOCK below the FORE-END. Secured by a PIN passing through a LOOP cast onto the upper surface. See TAILPIPE and TRUMPET PIPE.

PISTOL. A handgun. Manufactured in pairs for the Ordnance and classified by them in two broad categories, Land Service and Sea Service, of which there was only one type in each class until the mid-1750s when specialized variations began to appear for the new as well as the older branches of the services. During the first half of the Eighteenth Century it appears that most pistols were made on a regimental basis to the order of their colonels.

PISTOL BORE. .56 calibre, or 28 to the lb. See BORE.

PRIMING. A small amount of powder (about a dram or 27½ grains, or less, was poured from the paper CARTRIDGE in the PAN as the first operation after biting the cartridge open. Until the 1740s there is some evidence in contemporary training manuals that some regiments may have carried separate flasks containing special smaller grained priming powder.

R.

RAMMER (Ramrod). A long tapering thin rod of ash, later steel, used to seat the ball and wadding of the paper CARTRIDGE securely in the BREECH of the BARREL, i.e., to load the weapon. Infantry muskets were produced with steel rammers from 1749, but pistols, most carbines, and Sea Service arms continued to use wooden rammers until various dates some of which extend beyond our period.

RIBS & RINGS. The Ordnance term for a sling bar and ring as used on some dragoon muskets and carbines and cavalry carbines throughout our period, in place of the sling swivels used for most infantry arms. This flexible sliding ring arrangement mounted on the left side of the STOCK opposite the LOCK allowed the arm to be attached loosely to the body of the trooper by a shoulder sling while retaining sufficient maneuvrability to use the weapon in combat and still manage his horse. Prior to the 1740s ordinary muskets, usually with shortened barrels, were 'ribb'd & ring'd' for dragoon use. One end of the arm was usually supported in a leather 'bucket' attached to the saddle, when not in use.

RIFLE. A longarm, the interior of whose BARREL.is cut with a series of spiral grooves to impart a rotating motion to the projectile in its passage down the barrel, in order to give it greater accuracy at much increased distances. First purchased for the British army in 1746, but not used in combat until 1755, but only in very limited numbers. Continued use during the American War, but not regularly issued until 1800. Breech loading rifles were purchased in 1762, 1764 and 1776, but saw very little service.

S.

SEAR. An L-shaped bar connecting the TRIGGER with the TUMBLER on the inside of the LOCKPLATE, and held

in position by the sear-screw to the rear of the tumbler. The front, or nose, of the sear fits into the notches, or bents, cut into the tumbler and is held in place by the pressure of the SEAR-SPRING. When the TRIGGER is pressed, its blade bears against the tip of the sear, pushing the nose out of the tumbler notch and downwards away from it, releasing the tumbler to act against the pressure from the MAINSPRING.

SEAR-SPRING. A small V-spring mounted horizontally on the inside of the LOCKPLATE above the SEAR and bearing on it. See SEAR.

SIDENAILS. Ordnance term for the screws which hold the LOCK in the STOCK..

SIDEPIECE (SIDEPLATE). An ornamental plate let into the STOCK opposite the LOCK to strengthen the wood at that point and to protect the wood from damage by screwing the SIDENAILS too far into the LOCK.

SIGHT. Although always referred to by this term, the small rectangular block dovetailed and brazed to barrel about two inches from the MUZZLE was primarily intended to serve as a fixing point for the socket BAYONET. Arms not intended for bayonets, such as PISTOLS, often had no sights, although some CARBINES had conventional blade-pattern sights. No rear sights were fitted to regulation smoothbore arms during our period, although many are found with grooves filed across the BREECH to act as a rear sight, which appear to be contemporary with the use of the arm.

SLING. A two-piece buff-leather strap used to carry a longarm. They were fixed to the SLING SWIVELS by lacing, and could be adjusted for length with a brass buckle.

SLING SWIVELS. Iron wire loops fastened by screws to the front of the TRIGGER GUARD bow, and through the upper part of the FORE-END on MUSKETS and some CARBINES. See RIBS & RINGS.

SMALLWORK. Ironware consisting of the TRIGGER, PINS and SLING SWIVELS, and some screws not supplied by contractors for specific parts, e.g. BUTTPLATE screws.

STOCK. A shaped and carved slab of wood, English walnut heartwood throughout most of our period, into which the BARREL, LOCK, FURNITURE and SMALLWORK were inletted to form a firearm.

STOCK TIP. See NOSE CAP.

SWELL. The bulge in the FORE-END at the point where the TAILPIPE is inlet, formed to give the hand better and steadier purchase for aiming or bayonet fighting. Until the 1750s this was virtually circular and pronounced, but after that date it became oval and less pronounced.

T.

TAILPIPE. The lowermost of the several RAMMER PIPES, located where the external rammer channel enters the lower part of the FORE-END, which serves to guide the rammer into the hole and avoid damage to the STOCK at this point. Cast with an ornamental FINIAL let into the SWELL of the fore-end to strengthen it. On arms fitted with steel rammers, a flat spring is rivetted into the pipe to hold the rod in position. Omitted on Sea Service arms.

TANG. Projections from such pieces as the BREECHPLUG, BUTTCAP, BUTTPLATE and TRIGGER GUARD, generally designed to strengthen and to help secure the part to the STOCK. They often terminate in ornamental FINIALS.

TEARDROP. The shape of the HAMMER-SPRING FINIAL from 1778, and also of the termination of the LOCK and SIDE-PIECE FLATS of Land Service arms from 1756.

THREADS. The Ordnance term for the double lines of border engraving found on the LOCKPLATE, COCK, top JAW, and HAMMER of the LOCK. It was dropped from the top jaw and hammer in 1778.

THUMB PIECE (ESCUTCHEON). An ornamentally outlined plate let into the top of the GRIP on most Land Service arms during our period, intended to carry regimental information engraved on it which was not already engraved on the top of the BARREL or the BUTTPLATE TANG. This was usually the company and rack number of the individual soldier.

TOUCH HOLE (Vent). The small hole drilled or punched through the right side of the BREECH of the BARREL through which the flame from the ignited PRIMING in the PAN passed to ignite the main propellant charge in the barrel.

TREFOIL. The three-lobed decorative motif used on HAMMER-SPRING FINIALS for Land Service LOCKS until 1778, when it was superceded by the simpler TEARDROP

shape.

TRIGGER. The device which actuates the firing mechanism. A broad flat iron blade with a lower extension flattened at right angles to the blade for pressing with the finger. Hinged at its upper forward corner by a PIN through the STOCK, located towards the rear of the LOCK, to enable to upper rear part of the blade to bear upon the SEAR bar when pressed by the finger. When the trigger is pressed the nose of the SEAR is pushed out of the TUMBLER notch, releasing the tumbler to be acted upon by the MAINSPRING, which forces it downwards and backwards. The COCK, which is secured to the external square of the tumbler, falls forward and FLINT in its JAWS strikes the face of the HAMMER forcing it away from the PAN and allowing the sparks created by the contact to ignite the PRIMING in the pan. Part of the SMALLWORK.

TRIGGER GUARD. Part of the FURNITURE, whether of forged iron or cast brass, formed as a rough semicircle, with projections at each side called TANGS for fastening to the STOCK. The semicircular part is intended to protect the TRIGGER from accidental contact, while the lower tang serves also to strengthen the GRIP area of the stock. On longarms fitted for SLING SWIVELS the lower sling swivel screw usually passes through a thickened area at the base of the forward junction of the guard bow with the front tang.

TRIGGER PLATE. A flat brass plate with a slot in it, through which the TRIGGER passes, and for which it acts as a support and to prevent the trigger from becoming woodbound. It also serves as a baseplate into which the barrel tang screw is anchored. Sea Service arms and the Light Dragoon pistol do not have this refinement: a small iron square inlet ahead of the trigger serves the purpose.

TRUMPET PIPE. The uppermost of the RAMMER PIPES introduced in conjunction with the steel RAMMER as a guide and support for it. It is approximately double the length of the old barrel-shaped pipe which it replaces, tapers from front to rear, and is flared at the mouth for easier entry of the rod. Secured by two PINS.

TUMBLER. The central part of the LOCK mechanism which has the COCK fastened to its external extremity (the square) by the Tumbler Screw, and which transmits the action of the shooter through the TRIGGER and SEAR to cause the lock to function. Its internal

section has notches (bents) filed into it, in which the nose of the SEAR engages to hold it either in a safety position (half cock) or the firing position (full cock). Its forward part,(the toe) is borne upon by the MAINSPRING, which causes it to revolve when released by the action of the trigger on the sear.

V.

VENT. See TOUCH HOLE.

W.

WALL PIECE (WALLPIECE). A very large musket with a 54" heavy- weight barrel, often fitted with a heavy iron swivel resembling a rowlock through the lower part of the FORE-END. Throughout our period the bore size was about .98, intended to use a ball of 6¾ to the lb. They were intended for long range firing against artillery batteries or troop concentrations from fortress walls, and were most popular with colonial garrisons. There were only a few hundred made during our period, mostly during the first half of the century.

WINDAGE. A measurement achieved by subtracting the diameter of the ball from the diameter of the bore.

CHAPTER 1.

INTRODUCTION: THE PRE-GEORGIAN YEARS, TO 1714.

Although the origins of the Board of Ordnance may be traced as far back as the Privy Wardrobe during the reign of Edward I, the association of the Tower of London as the base for a fixed storehouse for the royal military small-arms with a distinct administrative organization to oversee those stores dates from the years of John Fleet's keepership of the Privy Wardrobe, 1323-44. His successor, Robert Mildenhall, was the first person to receive a Royal Patent for the 'keeping the king's Wardrobe within the Tower of London.' Henry Snaith's accounts from June, 1360, are the first continuous record of small-arms being kept as a regular part of the stores in the Tower, and there was by this time a small regular staff to attend to the repair and maintenance of these arms. However, even as late as the 1450s the Tower had not yet been established as the largest single government storehouse for arms; by a Royal Warrant of 30 Henry VI the Ordnance establishment was granted that part of the Tower precincts encompassed by Tower Wharf, from Traitor's Gate to St. Catherine's Gate, along with the buildings in that area.[1] Since that time, the buildings used by the Ordnance within the Tower have varied, but the use of the Tower Wharf area remained constant.

The number of officials increased gradually, and their titles gradually clarified, but the first patent issued for a Master of the Ordnance has not yet been located. The earliest association of the term 'ordnance' with an official in charge thereof occurs in 1414, but it was not until the second quarter of the Fifteenth Century that a definite split away from the Privy Wardrobe took place. There was a Master of the Ordnance from 1461, and by the beginning of the Tudor period an Ordnance establishment becomes more clearly defined. By the middle of the Sixteenth Century something approaching the later Board structure had emerged. In 1544 the Lieutenant of the

Ordnance took over as the functioning head of the Office, in company with a surveyor who appears in the late 1530s.[2]

The earliest instructions defining and guiding the actions of the officers of the Ordnance which have survived, appeared early in the reign of Elizabeth I, and much of the administrative structure which becomes familiar during the Seventeenth Century developed from the 1560s onwards.[3] The structure and operations of the Office under the Royalists has been studied by Dr Ian Roy[4], but the Commonwealth period of the Ordnance's history has not yet been dealt with as such. Tomlinson's study brings the organizational history of the Ordnance to the point where the present work begins.

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The entire organization of the Board of Ordnance was reformed and redefined by a lengthy set of instructions issued in July, 1683, with amendments in 1686.[5] These formed the basis upon which the Board was to function until its abolition in 1855. Since they cover the entire period of this study, an examination of their chief points is in order.

The operation of the Office was under the overall cognizance of a Master General of the Ordnance, appointed by Royal Warrant, and under him the Principal Officers of the Ordnance, also appointed by Warrant, and all considered as political positions. The Principal Officers included the Lieutenant General of the Ordnance, the Surveyor General, a Clerk of the Ordnance, Keeper of Stores [usually referred to as the Storekeeper or Principal Storekeeper], and a Clerk of the Deliveries.

The Master General was usually one of the great officers of State, a nobleman, and during our period usually a high-ranking army officer (e.g. Marlborough, Cadogan, Argyll, the third Duke of Marlborough, Ligonier,

Granby,Townshend, Cornwallis and Moira of the sixteen MGOs 1714-1818). Some of the Masters General took a personal interest in the post, but the evidence of their influence, with the notable exception of the third Duke of Richmond (1782-95) is slight. Townshend and Richmond are the only Masters General for whom there is evidence of a direct interest in small arms improvements. Because they were often absent on military service, much of their administrative work fell to the Lieutenant General to oversee, and their direct influence on the everyday running of the Office was limited to brief periods.

The Lieutenant General was the effective operational head of the Board of Ordnance, whose duties included the overseeing of the trains of artillery in the Tower and various out stations, and the training of the various artillery and engineering personnel which came under the overall control of the Ordnance, in addition to working with the Board to arrive at decisions regarding the maintenance and replacement of all the various types of military equipment for which the Office was responsible. He had also to supervise and oversee all of the inferior officers and departments of the Office, and to keep the Master General informed about their performance. Eight of the twelve Lieutenants General were high-ranking military officers.

The man who seems to have been most involved in the decision making processes regarding small arms supply was the Surveyor General. He had overall responsibility for all Stores of which the Storekeeper was in charge. He had to possess a working knowledge of all the various Stores in which the Office dealt, and to keep the several under officers as well as the various suppliers up to their individual responsibilities, and to ensure that all record keeping was correctly carried out. He also superintended the receiving of Stores, and the allowing of the bills received for them, and the keeping track of their maintenance, numbers and ultimate disposition. The upkeep of buildings of all sorts, arrangements for materials and

workmen to repair them were the responsibility of the Surveyor General. Sir Charles Frederick occupied this post for thirty-two of the most interesting years of our period (1750-82) and his influence, particularly in administrative organization, is frequently apparent. The only other individual to serve as Surveyor for any comparable length of time was John Armstrong (1722-42) but lack of the Minutes for almost the whole of this period prevent the assessment of his influence.

The Clerk of the Ordnance was really the head book-keeper of the Office, with responsibility not only for books but correspondence and the certification of various accounts. This department had charge of accounting for the receipt of all Stores, and for keeping records of their arrival, issue, and return into Store. He had also to prepare the wages lists and process the bills from contractors and other suppliers to the Office, and he acted as a control on the Treasurer's and Storekeeper's accounts. The destruction of almost all of the accounts of this department by official 'weeding' in the 1830s has deprived the modern historian of a vast amount of useful and illuminating detail. A dozen individuals, most of them aristocrats or noblemen, filled this office during our period.

The Principal Storekeeper was in charge of all the Stores which came into, were kept in, issued from, and returned to, the Tower of London, including all of the small-arms. This involved the keeping of various records and accounts of receipts, issues and returns, and the taking of inventories of what was in Store, its condition and value, which were known as 'Remains.' He was enjoined to receive no goods which had not been inspected and approved, or for which there was no written authority, and likewise to issue no Stores without full written authority, and to accept the return of no issued goods which had not been first re-examined (surveyed) and passed by the Surveyor's office. He was held financially responsible to the Board for most of his transactions.

Once again the destruction of the Issue Books kept by this department have deprived us of much uniquely important information.

The Clerk of the Deliveries acted as a secretary and book-keeper for the Storekeeper, being responsible for the preparation of the detailed lists, based on a Royal or Board Warrant, which the Storekeeper used to issue equipment, known as 'Proportions.' His records and accounts were a check on the Storekeeper's. Several of the seventeen Clerks of the Deliveries progressed upwards in the chain of command, notably Charles Frederick, Andrew Wilkinson and Henry Strachey.

The Treasurer of the Ordnance was required to give security for the 'faithful discharge' of his office, and acted as a middleman between the Exchequer (or Lords Commissioners of H.M. Treasury), and the Board, requesting from the Treasury all moneys required for the operation of the Office, and preparing all of the voluminous paperwork which this involved. His actual functioning in the payment of bills appears to have been confined to cash transactions, which were a tiny minority of the Office's financial operations, debentures paid 'in the course of the Office' being the usual means of reluctantly parting with money. His position was not considered as sufficiently important for him to be one of the Principal Officers of the Office.

As a group, the Principal Officers were required to live in or near the Tower of London, and to meet at a designated office at least twice a week. They were to keep the supply of military equipment up to a certain standard, and to deal on the basis of 'best Stuff, best cheape', i.e. the best quality goods for the cheapest price, in maintaining the King's Stores. They were to guard against any attempts at monopolistic practices on the part of contractors, and were forbidden to accept gratuities or to sell clerk's places for their own benefit.

Each of the above officers headed a small department of clerks and assistants who exercised more or less

influence and power according to the personality of the head of the office. As the years progressed the size of most of the department increased slightly, but permanent increases were far fewer than those made during temporary crises such as wars. Considering the responsibilities which it had for the defense of the nation, the Board's position in the governmental hierarchy was not high, primarily because the Office dealt largely with artificers, and craftsmen, and not with other ministers of state and foreign dignitaries.

Amongst the 'under ministers' who carried out the instructions of the Principal Officers, several relate to the area of small arms supply.

The Keeper of the Small Guns, later known as the Small Gun Office, had to give security for the performance of his duties, and was to keep all small-arms and their accoutrements in good order with the help of a Furbisher and his assistants. He was forbidden to receive any guns which had not been first surveyed, proofed, and marked.

The Messenger, apart from acting as a carrier of correspondence, delivered Warrants to the tradesmen and contractors, and visited them in order to encourage the timely completion of their work for the Office. He also made cash payments, what would now be called 'petty cash amounts' to various tradesmen including gunmakers. An important part of his work was to ascertain the market price of all the different articles purchased by the Office, and to inform the Board in order to facilitate their bargaining with the contractors. The Messenger also acted as a police officer for the Office, making arrests and arranging custody of those being held for the Board's attention. The Messenger was the chief contact between the Office and the civilian commercial community, and his widespread tasks must have formed what was perhaps the most onerous and yet responsible function within the Ordnance organization.

Although they operated entirely within the private sector of the economy, the tradesmen and artificers were

included in the structural organization of the Office for which the King laid down regulations. They were instructed to deliver only substantial quality work at reasonable prices, and to avoid the use of any poor quality materials. They were warned that being made an artificer to the Office did not imply the right to deliver shoddy goods, nor to a monopoly of supply. The Board retained completely its right to operate in a free and open market and to obtain its supplies from where-ever it chose at the best terms it could negotiate. Contractors were to hand in a bill for their work within ten days of delivery, and this bill would be allowed within another ten days, and a Debenture for payment issued within a month of the final delivery of the goods or services. They were also forbidden to purchase any decayed or unserviceable Stores of the type they supplied to the Office, and were told that no such goods would be sold to any clerk or other Office employee, but that all such would be offered at open vendue.

One category of under ministers which exerted far greater influence than their position in the hierarchy or annual wage would suggest was the Furbishers, or as they were later called, the Master Furbishers. During our period there were five of these men, all gunmakers in their own right. They knew not only the skills and methods of the gun trade from whom the Office artificers were drawn, but in some cases at least, the desiderata of various forms of small-arms, in the form of a personal opinion if nothing stronger. Although most of the evidence is indirect, they appear to have influenced the design of military small arms, or to have put forward colleagues in the trade who did. The continuance of several of these men to operate privately in one aspect or another of the gun trade occasionally caused problems, but in general their technical expertise and value to the Office seem to have earned them no more than a reprimand and warning not to repeat the offense. The most apparent infringement was the spending of too much time in the inspection of arms for

one or more of the great chartered companies, such as the East India Company or the Hudson's Bay Company, or in giving that work priority over the less well-paid King's work. This private work was normally tolerated so long as it did not impinge upon the Office's work.

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Apart from the administrative streamlining and clarification of the functions of Office officials brought about by the Instructions of 1683/6, the most important innovation in the operation of the Office during the period immediately preceding the focal era of this study was the introduction of the Birmingham gun trade to a significant share in the overall process of small-arms supply. This originated as the result of the greatly increased demands for small-arms created by the abrupt change in England's commitments to maintaining a European 'balance of power'. This new emphasis on, and involvement in, continental affairs came with the arrival of the Dutch Stadtholder, William of Orange, as English co-head of state in 1688. Operations in Ireland to guard against a Jacobite attack in rear, increases in the standing army in Britain to support the new rulers against domestic Jacobites, as well as contingents sent to the continent in aid of the anti-French alliance, called for greater quantities of arms than had heretofore been required of the workforce controlled by the Office.

Birmingham was a manufacturing village as early as the reign of Edward III, but the production of firearms in the area appears not to pre-date the Seventeenth Century. Its location in the centre of an area rich in coal and iron deposits, with ready access to timber and charcoal and a good if seasonal water supply for the operating of grinding and boring mills made it natural that such trades as nailmaking and ironwares manufacture should develop. In speaking of 'Birmingham' throughout the period under review, it should be taken as meaning the town of

Birmingham itself but including also the so-called 'Black Country' towns of Darlaston, Wednesbury, West Bromwich and Wolverhampton, which formed an integral part of 'the Birmingham gun trade.' During the Civil Wars, the Parliamentarian armies received some of their small-arms from Birmingham manufacturers,(thereby incurring the displeasure of Prince Rupert in 1643),[6] and by the late 1670s a number of Birmingham gunmakers have been identified. But there is no doubt that the development of gunmaking as a separate trade developed largely as the result of efforts made by the M.P. Sir Richard Newdigate Bt. of Arbury during 1688.

The details of Newdigate's lobbying have not survived, but on 10 January 1689 the Board sent him two flintlock muskets as patterns, and asked him to sound out the Birmingham gunmakers on the supplying of complete guns as well as separate supplies of barrels and locks.[7] The results satisfied the Board, and a contract ensued, the details of which are unknown, apart from one payment of £1,016.18.6. made in July, 1690.[8] A further contract was signed in 1693 between the Board and five named Birmingham gunsmiths 'on behalf of themselves and the rest of the gunmakers of Birmingham' for the delivery of muskets at the rate of 200 per month for one year, at the rate of 17/- per musket.[9]

One of the chief advantages to the Office of using the Birmingham trade to the utmost of its ability was that the town of Birmingham and its manufacturers were under no such corporate limitations and controls as hindered the London trade. The Birmingham trade could be expanded without limitations being imposed by a mediaeval-style guild structure such as limited the London trade. The Worshipful Company of Gunmakers, though a very recent arrival on the guild scene (1638), were very jealous of their monopoly rights in the supplying and proving of gun barrels, and as soon as it became clear that the Birmingham trade was able to fill a need on the part of Government, they began agitation to destroy this

alternative source, despite the fact that they were themselves unable to fulfil the need. While there were sound reasons for a control to be exercised over the production of gun barrels, to avoid accidents from bad materials and cheap but unsafe methods of manufacture, these strictures did not apply to Ordnance work as it was always subjected to proofs and inspection considered fully adequate by the Board. Petitions and complaints to the Board about shoddy work, invasions of their charter, and depression of their trade, are the only documentary evidence of this agitation by the Gunmakers Company, but it is clear that other intimidatory practices were used to protect their privileges. This situation forms the background of one of the major reasons for the increasing efforts of the Office to concentrate the production of military small-arms as much within its own direct control as possible.The precedent for such central control was by no means of recent origin: as early as 1572 a bill was read in the House of Commons which proposed various features of standardization including a common.size for the bore of the musket, and that any aspiring gunmaker should first submit a proof piece which would have to be examined against a bore gauge supplied by the Master of the Ordnance, and otherwise approved of.[10]

Efforts to suppress the Birmingham trade proved unsuccessful, and the West Midlands area rapidly developed a civilian as well as a military gun trade. By about 1700 the area was a recognised source for locks and barrels for both civilian and military gun trades. The Ordnance began to rely on Birmingham for its supplies of gunlocks, barrels, and iron furniture, because they were cheaper and of no worse quality than those obtained in London, while the casting of brass furniture and the assembling of guns tended to remain in the hands of the London trade. But the transition to this system of dual supply centres was not fully achieved until the 1720s. During the years from the early 1690s until 1716-17, the Birmingham trade continued to supply not only barrels, locks and furniture, but

complete weapons as well. On subsequent occasions throughout the Eighteenth Century they again furnished complete weapons, and when the final re-organization of the 'Ordnance System' was made in 1804, they once again became suppliers of complete arms as well as component parts.

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The injection of the Birmingham trade was the first of several changes in the structure of the arms manufacturing processes of the Board of Ordnance in recognition of the greater responsibilities for national defense thrust upon it by the accession of a European-oriented monarch. The stresses of the long years of the War of the Spanish Succession (1702-1713) brought further changes and, ultimately, the emergence of a system which differed markedly from that in use in 1688. The surviving documents do not make it clear whether this evolution was planned as such well in advance of its achievement, but the very ad hoc nature of governmental operation at the time makes this forethought unlikely. Response was to immediate situations, solutions were for particular problems.

The procedure used to procure a supply of arms prior to the 1720s was based upon the application of the Board of Ordnance to a group of gunmakers within, and controlled by, the Gunmakers' Company of London. Often the spokesman for the group was the current Master of the Company, and he was always amongst the group which subsequently supplied arms to the Ordnance. A quantity of arms to be supplied was stated by the Board, and a costed specification was produced for the makers to estimate their price. Sometimes this resulted in a counter-pattern from the Company when the Board expected too much for their suggested price. Once the pattern and its price had been agreed upon, the total number was divided up amongst the members of the Company most able, or considered most

worthy by the Company, to complete the work. No one who was not approved of by the Company could put his name forward to become an 'artificer to the Office', and so long as he remained in the good graces of the Company's hierarchy, he would be protected against complaints by the Board about bad workmanship or tardy deliveries. The number of gunmakers to be provided for was large, and it is not unusual during this period for as many as 150 different makers to be employed in the completion of one Ordnance contract; each maker received only a small percentage of the total, usually less than 100 arms each. Pistols, carbines and musketoons were allotted either to those who specialized in them, or to those it was felt by the Company could deal best with them. Where the number of guns was relatively small, only the 'chosen' makers within the Company would be put forward. Almost one-third of the total number of gunmakers who worked for the Office were employed during this period, and not after. Under these conditions, quality control by the Ordnance was extremely difficult: time consuming, expensive, and impossible of careful enforcement. Since weapons were supplied as complete units, there was less opportunity for inspecting components in the course of construction, to ensure the use of good quality materials and workmanship. There was no 'in house' inspection until the completed arm was ready for taking into Store. Because there were a great many mouths to feed, much use was made of repairing and re-furbishing old arms, (what might now be called 'busy work' often undertaken just to keep the gunmakers occupied), and this work was put out to those gunmakers who were best at delivering in their work on time and of good quality. The majority of Sea Service muskets were obtained through this device. Decisions about the design details appear to have been worked out at meetings of Company and Board officials, although the Ordnance did lay down the basics such as barrel length, bore size, stock material and important features of the lock. The Board would submit to the Company a written specification, and the Company would

reply with a pattern gun with a price attached for the number required. Price v. workmanship and finish was a area for open and full negotiation at the beginning of every new contract. 'Open contracts' were much used, whereby the Board would agree with the Company a certain basic requirement as to numbers, price, pattern and delivery time, and then any maker who felt he could fulfil these requirements would sign on. Details were necessarily loosely defined. If an insufficient number of gunmakers came forward to sign on for their share of the contract as arranged, then the Board would have to re-think its terms, and usually raise the price or alter the terms of delivery, or even simplify some point of design to reduce the work while not lowering the price. There was never any guarantee that the Board would obtain the number of guns it needed in the time and of the uniform quality required. Default of contract could never be effectively punished because there was (until Birmingham appeared) no alternative source (except foreign purchase, which was not considered satisfactory for first-line weapons). When the weapons were completed and delivered to the Tower for inspection, they were inspected and proved by members of the Gunmaker's Company hired by the Board. A rota of certain makers assisted the Board's two paid Proof Masters in this crucial stage of the procurement process. This self-inspection was yet another undesirable feature avoided when using the Birmingham trade, since inspectors from the Board went to the maker's premises and inspected the barrels and locks and muskets on the spot before they were shipped to the Tower. This practice continued throughout our period, and during major wars there were resident viewers from the Board, with assistants, in Birmingham.

Prior to the expansion of England's international responsibilities consequent upon the accession of William & Mary, the need for arms had been filled by the London trade, with occasional purchases in the Netherlands to make up shortages. Once the need for arms developed beyond

this insular requirement, the extant London trade was inadequate and Parliament was unwilling to see additional trade put into the hands of foreigners. The Birmingham trade provided an alternative and additional source, but the focal point of the procurement procedure remained the Gunmakers' Company and its members, acting, as it saw fit, in concert with the Board of Ordnance. The great, and over-riding problem was, that there were not enough sufficiently skilled gunmakers who could manufacture to the standards set by the Board. They were sometimes forced to rely on makers who had previously been unsatisfactory in their performance, simply because there were none to replace them. As the Eighteenth Century progressed, it is surprising to note that ever fewer London gunmakers were considered by the Ordnance sufficiently skilful to work to a pattern for a quantity of guns. This may have been one of the chief reasons for the final re-organization of the system in 1804, in which only a tiny proportion of the London trade was involved.

Despite the re-organization of the relationship between the Gunmaker's Company and the Ordnance during the early Eighteenth Century, and the greatly increased uniformity and quality which this produced in the arms made for the Ordnance, the question of quantity, especially quantity at short notice, was never solved within the framework of the English gun trade either during our period or subsequently. Since use of firearms for military purposes had developed in the early Sixteenth Century, buying arms abroad had always been necessary, and in the absence of an adequate gun trade during the entire reign of Henry VIII, he was obliged to obtain small-arms on the Continent. As the size and abilities of the English trade increased over the next several centuries, foreign purchases became smaller and more periodical, but throughout our period they could be counted on at the beginning of every war. The arms came from the Low Countries, and early descriptions are sufficiently vague to obscure whether this means the modern, post-1830

Netherlands, or Belgium. Flanders was already well-known for its armaments industry, and Liège was on its way to a worldwide market by the middle of the Seventeenth Century. It seems most likely that the pre-1700 purchases may have come, as did the 1715 purchase, from Dutch arsenals, many as second-hand arms, but after 1715 and for the next century, the documents indicate that Liège was where the arms were manufactured.[11]

* * * * * * * * * * *

The ignition system of all the small arms covered by this study was known as the flintlock. The similar term 'Firelock' was used in military parlance to refer to the whole arm otherwise known as the infantry musket. The mechanism, known as the lock, is located at the breech end of the barrel, and is mounted on a case-hardened iron plate inserted into the right side of the stock (see facing Plate 1). This metal plate, called the lockplate, held the various parts required to ignite the priming powder which lay in the pan immediately against the barrel. Of the external parts, the cock held between its upper and lower jaws a specially shaped flintstone; when the trigger was pulled the cock was released under heavy pressure from the mainspring and was impelled forward against the tempered steel face of the hammer. The hammer, an L-shaped piece combining a striking face for the flint and a cover for the priming pan, and itself held in either open or closed position by the feather-spring, was forced back by the flint in the falling cock, and as the flint scraped tiny particles of incandescant steel from the face of the hammer, these fell into the priming powder in the pan as this was exposed by the opening hammer. The flash from the ignited powder in the pan passed through a hole punched or drilled into the right side of the barrel immediately adjacent to the pan, and ignited the main propellant charge in the barrel.

Although the flintlock represented a vast improvement

over earlier firearm ignition systems, yet it contained several features which required skilled workmanship to make it effective and reliable. The hardening and tempering of the face of the hammer was critical to the striking of hot sparks by the flint. The balance of tension between the mainspring and the feather spring was critical to the rapid and correct interaction between the cock and the hammer: if one spring was out of balance with the other the hammer might not open sufficiently for the sparks to reach the priming powder, or the cock would drop down the face of the hammer without striking adequate sparks; flints might also be smashed against the hammer if the mainspring were too strong. The close-fitting of the pan-cover section of the hammer against the top surface of the pan was essential to prevent ingress of rain, but no amount of clever work could prevent moisture entering over a period of time. The dimensions of the flint affected the operation of the lock: if the flint were too short it would fail to push the hammer back sufficiently to open the pan. If it were too long, it would smash its leading edge against the pan and break when used for the first time, and otherwise would not allow the hammer to be fully closed on the pan, admitting moisture. The quality of flints was also critical to the reliable performance of the lock, and until the centre of the flint supply was moved from Kent to Suffolk early in the 1790s, many regiments spent their own funds in supplying their troops with good quality flints, since those from the Ordnance were reckoned of such poor quality. The Board attempted to sidestep this problem during the first half of the century by the importation of French flints, but this supply was irregular and insufficient. A normal musket flint was officially expected to last from five to fifteen uses.

Ammunition during the entire period of this study was made up in the form of paper cartridges, a device whose first military introduction is generally credited to King Gustavus Adolphus of Sweden during the Thirty Years' War. A sheet of cartridge paper was cut to a prescribed form

[redacted] and partially rolled around a wooden former; a cast lead ball was then placed at one end of the partially formed tube, and the rest of the paper rolled around the former, so that a layer of paper separated the ball from the cavity for the powder. The ball end of the tube was then tied with strong twine. The former was then withdrawn and the opposite end of the now empty tube received a pre-measured charge of gunpowder from a tin charger issued in musket, carbine and pistol sizes. That end of the tube was then closed by twisting the paper. While cartridge paper, ball, wooden formers and twine were issued by the Ordnance, the ammunition was made up by the services. The Guards regiments stationed in the Tower of London, manufactured the basic supply for issue by the Ordnance, and soldiers chosen from each company of each regiment, either for their skill in cartridge-making or simply their manual dexterity, gathered in groups by Commanding Officers in the field, made up supplies of cartridges from components issued by the local Royal Artillery stores.

To use the paper cartridge, whether in longarms or handguns, the usual process was to bring the cock of the lock to the half-cock position, which gave clear access to the priming pan. Then the cartridge was removed from the cartouche box, and the twisted tail of the cartridge was torn off with the teeth, exposing the powder charge. Enough of this was poured into the pan to serve as a priming charge, and the hammer was closed on the pan. The remainder of the cartridge was then placed in the muzzle of the barrel, and the powder poured down while the body of the cartridge was pushed into the barrel, ball uppermost, still wrapped in its paper. The ramrod was then used to seat the ball and paper on top of the propellant charge in the breech of the barrel. This basic method was reduced to a numbered manual exercise by the armed forces.

Footnotes to Chapter 1.

1. Brevia de Private Sigillo, 30 Henry VI.

2. H.C. Tomlinson, Guns & Government, (London,1979), 1-3.

3. Ibid., 3-4.

4. I. Roy, The Royalist Army in the First Civil War, (Oxford Ph.D. thesis,1963), 278 ff.

5. ~~See Appendix 3 (1).~~ OMITTED.

6. C. Harris, The History of the Birmingham Gun-Barrel Proof House, (Birmingham,1949), 6.

7. Gentleman's Magazine, 1869, 296-7.

8. Harris, loc. cit., 9.

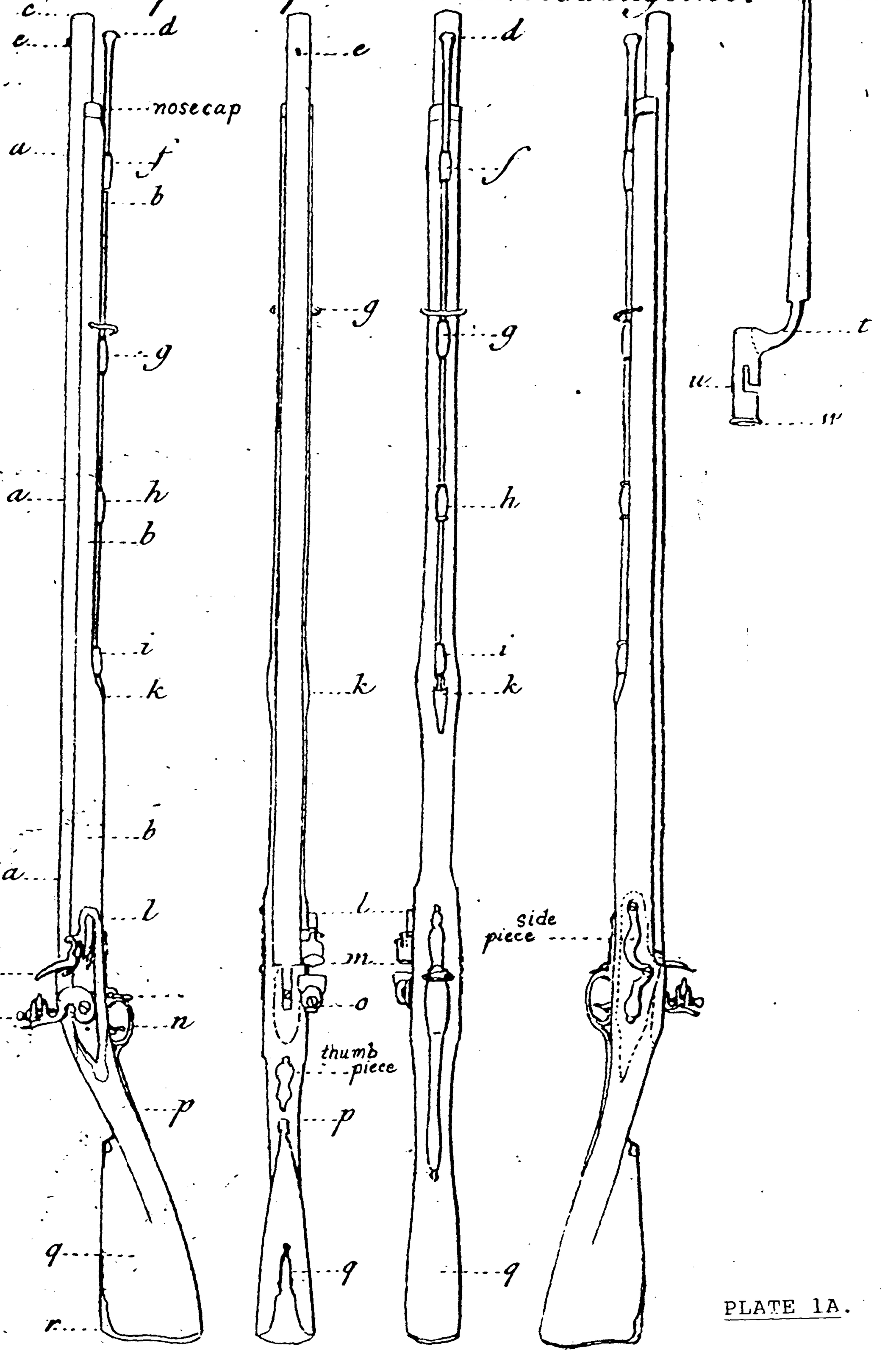
9. Gentleman's Magazine, 1869, 299-300. The gunsmiths were William Bourne, Thomas Moore, John West, Richard Weston and Jacob Austin.

10. Calendar of State Papers, Domestic,1566-79, addenda volume.

11. e.g. Public Record Office, War Office 51/146, 180; WO 55/1795, folder 808; WO 47/58, 8; WO 47/87, 355; WO 52/65, 13 Nov. 1794, 19 May 1794.

...ion of the Flames of the several parts of a Firelock & Bayonet.

39a

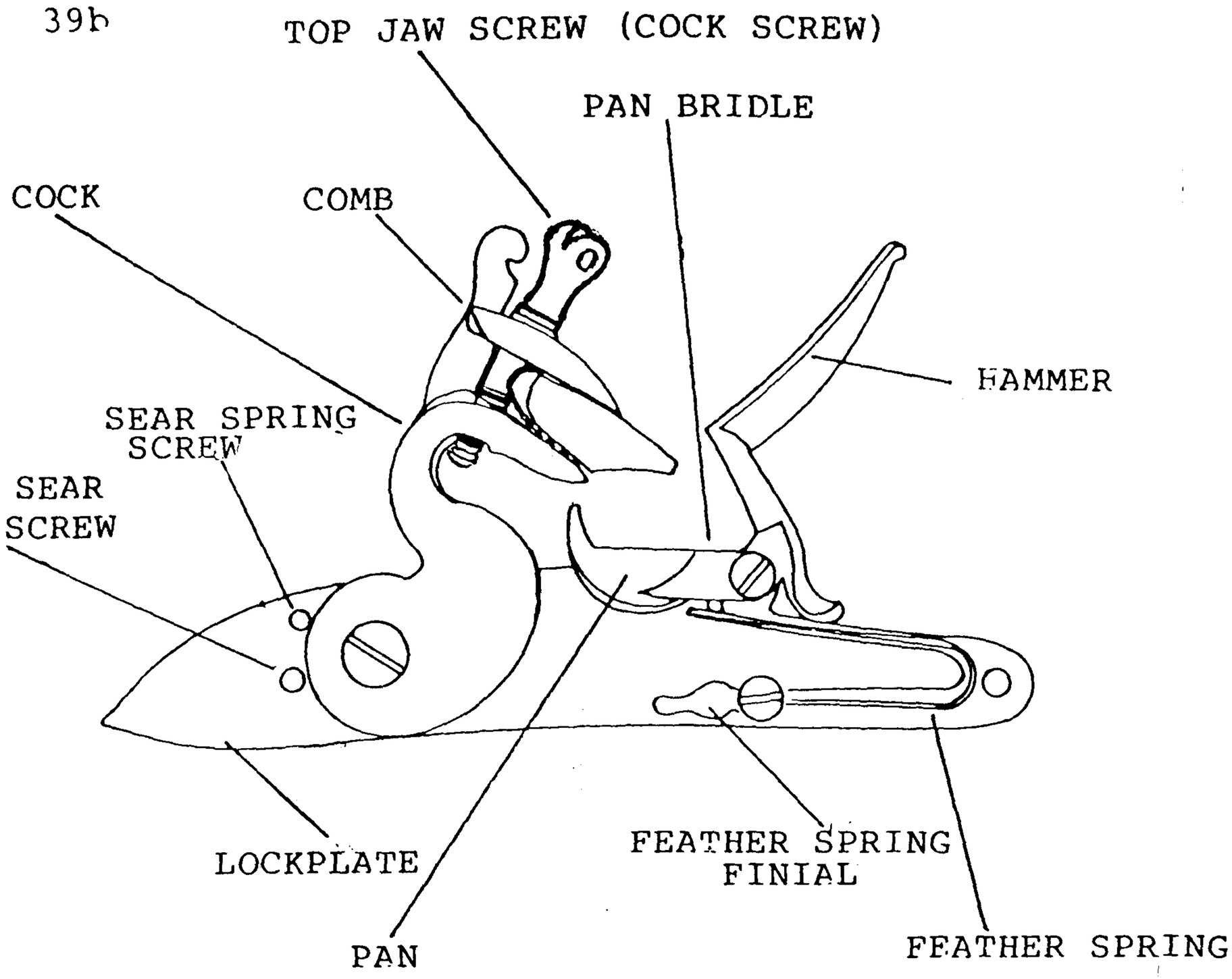


References

a a a the Barrell
b b b the Stock
c the Muzzle
d ... But of the Rammer
e ... Sight
f ... First Loop
g {Loop and Swivel for the Slings
h Third Loop
i Tail Pipe
k Swell of the tail Pipe
l Feather Spring
m Hammer
n Trigger & Guard
o Cock
p Small of the Stock
q Butt
r Swell of the Butt
s Point of the Bayonet
t Bend of the Shank
u Socket
w Notch of the Socket

PLATE 1A.

From ... e Use of the Militia... of Norfolk, (1758


TOP JAW SCREW (COCK SCREW)
PAN BRIDLE
COCK
COMB
HAMMER
SEAR SPRING SCREW
SEAR SCREW
LOCKPLATE
FEATHER SPRING FINIAL
PAN
FEATHER SPRING

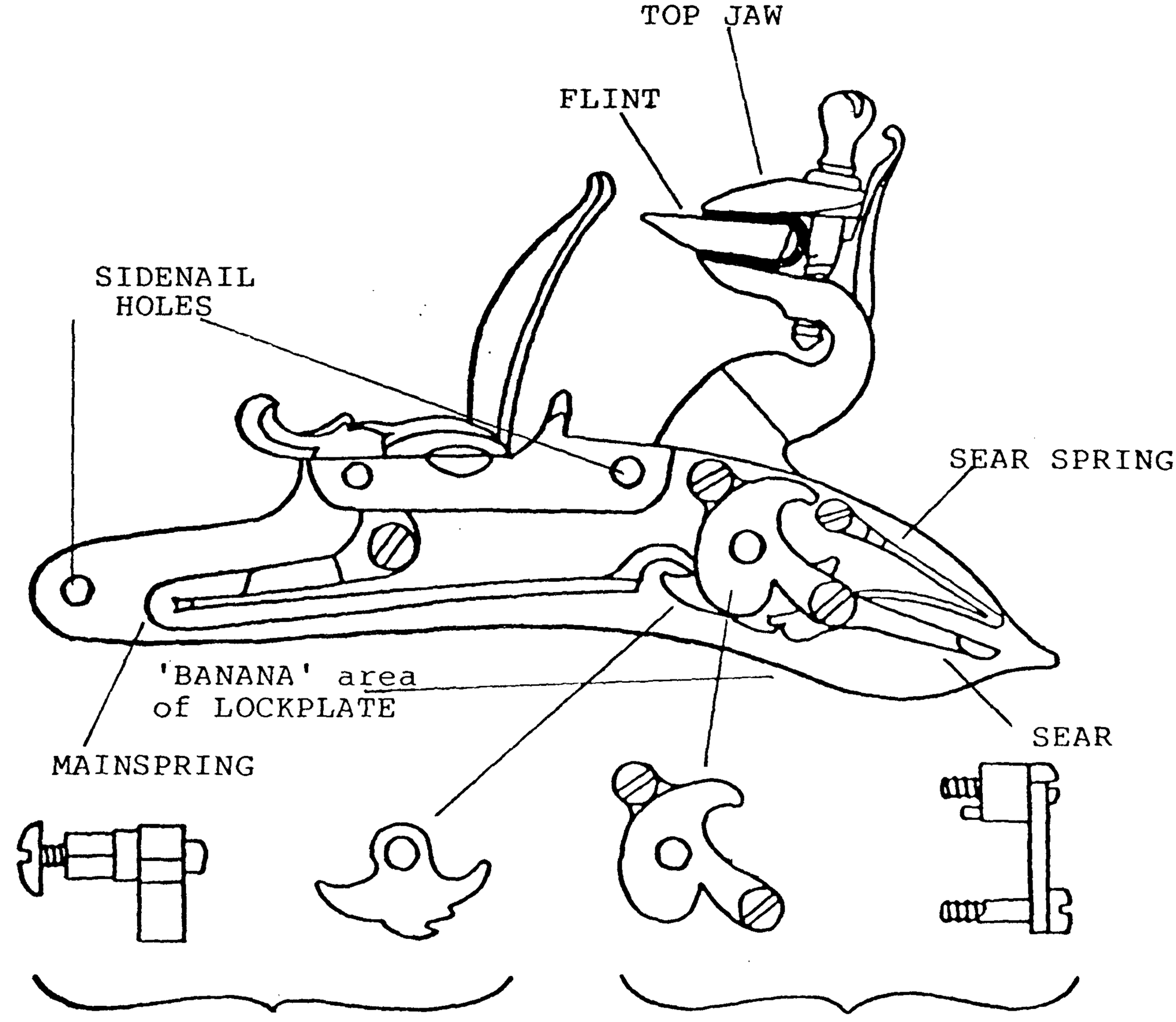

TOP JAW
FLINT
SIDENAIL HOLES
SEAR SPRING
'BANANA' area of LOCKPLATE
MAINSPRING
SEAR
TUMBLER
BRIDLE

PLATE 1B.

CHAPTER 2
PEACE AND WAR, 1713 - 1740.

The general European peace brought about by the treaties of 1713 marked the beginning of an era of expansion and improvement in the manufacture of military small arms throughout Western Europe. The strains placed on all aspects of small arms supply by the long wars of Louis XIV had demonstrated the need for closer governmental control and supervision of the entire arms making process, and for the improvement and standardization of weaponry so far as this concept was then understood. In practical terms this meant the setting up, or expansion, of national armouries, and the adoption of specific national patterns or models to guide the manufacture of a set number of weapons. These practices were brought to the highest degree of development during the first half of the Eighteenth Century in France [1], Prussia [2], Russia [3] and Spain [4], with France undoubtedly setting the pattern for the other states. Austria, Naples and Piedmont-Savoy followed the general pattern but more slowly and with less apparent success.[5]

In Great Britain the new era made less impact, partly because the landed gentry who most affected the operation of government were not of a military nature, and were most unwilling to spend any more money on what they saw as military paraphernalia. Parliament would, as a result, grant no funds for the setting up of a national armoury, indeed no evidence exists that the suggestion was ever mooted. An English national armoury did not appear until another century had passed and several large-scale wars had driven home the lesson that the private sector could not, and on occasion would not, supply an adequate number of acceptable quality uniform pattern military arms to meet the national requirements.

What did take place in Britain, or more accurately England, with the return of peace, was a tightening up of

control over the manufacturing processes by the officials of the Board of Ordnance, and an adjustment of the relationship between the Board and its suppliers. The framework laid down by the Instructions of 1683/6 was not altered, but the duties of several Board officials were expanded, more in practice than by regulations. As with so much of the Board's administrative activities, it is possible to study their development or lack of it only by noticing results, and not from precise announcements of new policy or practice.

Under the existing system the supply of small arms for the armed forces of Great Britain was in the hands of the civilian gun trade, primarily in London, with the Birmingham district acting primarily as a supplier of components such as barrels, locks, and iron furniture, with a small number of complete arms. The Government was just another customer, with about as much control over what they bought as any large customer might expect to exert. Unfortunately they were not always the largest customer, nor frequently a quick-paying one, and had often to compete with the large chartered trading companies who formed an increasingly important part of the nation's economic strength. This factor, along with the contempt in which land forces were held in England, generally left the Government in a weak position when arms were needed, especially at the outbreak of a war. Every contract made by the Board was preceded by the conventional marketplace haggling over article v. price, and the results appear to have been a compromise. Military small arms made in the decades preceding the re-organization are of conspicuously lower quality design and finish than those which followed it. If no compromise could be reached, or the quantity of arms required could not be furnished in time by the local trade for a variety of reasons (e.g. too low a price offered for any of the components, with the East India Company offering them a shilling more per piece), then the Board's only recourse was to foreign purchase.

Foreign purchase would produce adequate numbers of

arms for a cheap price, but they would be of relatively low quality compared with the domestic product. Parliament was naturally in favour of supporting home industry, and the complaints and petitions of the Gunmaker's Company and its backers often placed the government in an awkward position. Therefore the expedient of foreign purchase was resorted to only in real emergencies such as the outbreak of a major conflict, which in our period means 1715 (the Scottish uprising), 1740-1 (the War of Jenkin's Ear), 1756 and 1759 (the Seven Year's War), 1778-81 (the worldwide part of the American War) and 1793-1802 (the French Revolutionary wars during which Liège was lost as a supply centre in 1795).

Throughout our period the chief competitors of the Board in the arms market were the African slave trade, and the East India Company, as well as the Hudson's Bay Company and the Royal African Company and its successor. Of these the slave trade and the East India Company took up the largest part of the gunmakers and thus posed the greatest threat to the timely acquisition of suitable arms by the Board. Both the company and the trade dealt in arms of lesser quality and simpler design than were demanded by Government. They required less skilled workmanship, and were paid for with acceptable promptness as a straightforward commercial transaction. As far as the Company's requirements were concerned, these were fulfilled within a regular calendar, the 'shipping season,' so that the gun workers had ample time to complete the work. For what they were, the guns demanded were paid for at a higher rate than was offered by the Board. There was more profit to be made from slave guns, and the simple design was in constant and growing demand, and more men were capable of building them than the more complicated and comparatively highly finished arms demanded by the Board. Shoddy materials could be passed off in the trade at a good profit, but bad work and/or poor quality materials on Government work was liable to produce repercussions if it was detected by the inspectors

who were, even before the re-organization, much more in evidence than any from the trade. So long as barrels passed proof, the London Gunmaker's Company gave its members little trouble in their commercial pursuits.

Apart from the higher quality in workmanship and finish insisted upon by the Board, there was the question of uniformity in design. This was a stumbling block for a majority of the trade, and even towards the end of the Century the Board commented that only a small proportion of the London trade were capable of making arms sufficiently close to a fixed pattern for Government use.[6] Political requirements, such as treaties promising military aid, and military emergencies, often created demands on the trade which they were unable or unwilling to meet. The agreement with Portugal for assistance including arms in 1704, and the loss of 4000 arms at Almanza in 1707, are but two examples which created much friction.[7] Payment by the Board was a tortuous and time-consuming process in which the workmen often waited months or years to be paid, and this was one of the areas which got worse, rather than better as the century progressed, though it must be said chiefly in wartime conditions.

All of these factors combined to create a situation which required remedy. The new system which begins to appear between 1710 and 1715, was intended to place the Ordnance in a commanding position at the centre of the supply operation, where all facets and every stage of the manufacturing process from the procurement of raw materials to the receipt of the finished product could be effectively controlled and supervised. The increased participation of the Board's own employees in the inspection processes would eliminate many existing weak points where the manufacturers inspected their own products, and such inspections would ensure both the quality and the uniformity of the component and its workmanship. An increase (though slight) in prices and more carefully written contracts with strict penalties for late deliveries would tend towards the timely arrival of

components. Issue of the required components by the Board should ensure timely receipt of all the necessary pieces by the appropriate workmen in sufficient time to complete the work to the Board's schedule. For this purpose the Tower of London would become not only the chief storehouse, but the receiving and distribution centre for components as well as the finished products.

The new system did not come into being overnight, but was gradually implemented over a period of some two decades. This appears to have been due to a variety of factors. Firstly, the Board did not, indeed could not, alter the fact that arms were needed only occasionally, especially in relative peacetime conditions; there could be no constant activity of arms manufacture during which to work out the details of the new regime. It was necessary to work within the limitations of Parliamentary funding, which, in peacetime, was never adequate. The decision-makers do not seem to have been possessed of a sense of urgency, being content to let various parts of the new approach be implemented as circumstances allowed; they may, indeed, have had no choice. Predictably, there was obstruction from the trade, especially from the Gunmaker's Company, whose influence and control would be (designedly) greatly curtailed and reduced by the new system. The workmen who would be affected by the altered conditions would need time and experience to consider how far they were willing to adapt their processes and techniques to the new requirements.

Perhaps the greatest obstacle to the Board's efforts towards the centralization of control and the establishment of greater uniformity in production was the structure of the guntrade itself. During the latter half of the Seventeenth Century, and for the next hundred and fifty years the strong trend within the trade was towards specialization of labour. The many skills involved in the manufacture of a firearm were separated, so that each major division such as barrel making, lock making and stocking were further sub-divided, with each process being

considered as a separate trade. The term 'gunmaker' referred only the man or firm which initiated the processes which brought together in the end a complete arm, chiefly by paying for the work to be done by a force of workmen which he had selected; he was, in short, not so much a tradesman as an entrepreneur. In 1747, the London trade was described as being divided into no less than twenty-one different branches, which for clarity are listed in column form:

Barrel:	Forger; Filer; Polisher; Loopmaker	(4)
Breech:	Forger	(1)
Lock:	Forger; Filer; Polisher; Hardener	(4)
Trigger and Nail:	Forger; Filer	(2)
Stock:	Maker	(1)
Furniture:	Forger or Founder; Filer & Cutter	(2)
Tip & Pipe Maker		(1)
Side Piece and Thumb-Piece Repairer & Polisher		(1)
Engraver		(1)
Bluer		(1)
Stick [ramrod] maker		(1)
Flint Maker		(1)
Mounter or Screwer Together		(1)[8]

As will be shown presently, part of the process adopted by the Ordnance in its rationalization programme, amalgamated several of the above, at least in Ordnance terms, and obtained more than one service from a single contractor (however many sub-contractors he may have employed).

Before going into the details of the operation of the new system of supply, the actual processes involved in the manufacture of small arms must be examined in order better to understand how the changes would affect them and to appreciate the value and relevance of these changes.

* * * * * *

The several small arms which the Board required may be broadly classified as MUSKETS, CARBINES and PISTOLS. Bayonets for the first two categories were also required for most types. In the first and third of the these categories there were important sub-divisions for Land Service (the army) and Sea Service (the navy). Ancillary arms were occasionally required in reduced numbers. These include the RIFLE which first appeared as a production item rather than an outside purchase in 1762, the WALL PIECE which was an enlarged musket intended for long range firing from fortifications, and the naval MUSKETOON (usually called a blunderbuss in civilian parlance) which was a short, heavily built carbine in which the muzzle of the barrel actually or apparently flared for easier loading when the user was in motion (as in a ship or boat). All of these arms were produced by the same gunsmithing techniques, except that the rifle required the cutting of spiral grooves on the inner surface of the bore. Each was composed of the same basic component parts: barrel, lock, stock, furniture or mounts, and smallwork (trigger, sling swivels or ribs & rings, iron-wire pins, and screws - called nails in Ordnance parlance).

The gun barrel was made of iron. The barrel forger obtained the raw material in bar or flat form, and using fire, hammer and anvil reduced the piece to the correct length and thickness. Then, using a central core-piece of appropriate diameter known as a mandrel, he beat the strip around the mandrel and longitudinally welded it, forming a tube open at both ends. The barrel borer then smooth-reamed the inner surface, or bore, of the barrel, and usually fine-bored it as well. The breechplug was then threaded into the breech of the barrel, closing that end of the tube. The touch-hole or vent was then either drilled or punched on the right side of the breech. The barrel grinder reduced the outside diameter and shape to the correct thickness and taper, and the final stage of the work was completed by the barrel filer, who gave the outside its breech rings and final finish, and fitted the

barrel loops on the underside, and the sight which also acted as a fixing stud for the socket bayonet, near the muzzle, so that the barrel was considered 'fit for stocking.'

The manufacture of a gun lock was an even more specialized industry, and required very considerable skill and experience during the flintlock era to achieve a correct balance of tension between the feather-spring and mainspring, and the temper of the face of the hammer. The lock forger who began the process at the anvil, used a mould or 'jigger', like a die, cut out in the shape of the lockplate with its pan. Into this die a billet of red-hot iron was beaten. When it had cooled the billet was knocked out, and the excess metal around the edges was trimmed off. Most of the other large parts such as the cock, hammer, tumbler, bridle, and sear were formed in similar moulds. The three springs, main- sear- and feather- were a separate speciality, and were fitted by the lock filer who finish-shaped and assembled the various parts. The lock polisher polished and fine-fitted all the components and the lock was now ready for engraving and then hardening of the lockplate and hammer. The holes for the sidenails were drilled and tapped prior to the hardening process.[9]

Throughout our period the stocks of British military small arms were made with English walnut, normally of the superior heartwood only. During the post-1804 period when demand reached unprecedented heights and time was more than usually lacking, both heart and sapwoods were officially accepted for some patterns and grades of arms. Prior to 1715 some Sea Service muskets had been stocked with beech, but this does not appear again during the Eighteenth Century.Walnut was procured as plank by the running foot, or as stock blanks already rough-sawn to the basic outline and thickness. Once the basic outline had been achieved by sawing, the next stage was to inlet the barrel, and then the lock. The ramrod groove was next cut and bored, and then the buttplate was fitted. After this the remainder of the furniture was inletted and the final

shaping and sanding of the stock was done. The wood was finished with linseed oil. The Ordnance method of carrying out these procedures differed markedly from the civilian, and is discussed below (see page 65).

Until the early 1740s a certain, difficult to determine, percentage of British troops carried iron-mounted muskets. Their period of greatest manufacture was between 1718 and 1730, but after that cast brass achieved a predominance which was to continue for the rest of our period. As might be expected, the founding (or forging in the case of iron) of gun furniture was an integral part of other founding work, and the firms concerned were general founders rather than a particular branch of the gun trade. The patterns would be furnished variously by the founder or the customer, and once a mould had been made it became public property, even in the case of Ordnance patterns. Conventional casting techniques, using sand moulds, were also used for gun furniture, which consisted of the buttplate, sideplate, trigger guard, trigger plate, thumb-piece or escutcheon (at the wrist, grip or small), and ramrod pipes. From the 1750s the stock tip or fore-end cap was added. Separate firms were employed to supply the brass tips for wooden ramrods, since they were made up from sheet brass brazed together. While the majority of the furniture made for the Ordnance was of virgin brass, a fair minority was cast from old furniture which the Ordnance sold back to the founders for re-casting into new furniture. Normally this re-cast furniture, being more brittle than virgin brass, was reserved for Sea Service and second-line arms, but detailed evidence of use is lacking. Gun furniture was normally supplied to the Ordnance in the finish-filed state for Land Service arms, and in the rough cast state for Sea Service arms.

Smallwork consisted of the trigger, iron wire for cutting to length as barrel and furniture fastening pins, and for the trigger pivot, sling swivels (or side ribs and rings for mounted service carbines), and screws for metal and wood. The trigger was forged with a mould in a similar

manner to the lock parts, although the civilian trade rarely resorted to this refinement, preferring the cheaper method of forging on the anvil and filing to shape. Threads for woodscrews were usually cut on a lathe, while those for metal screws were cut by hand in steel screw-plates.

Wooden rammers (ramrods), which formed the universal method of loading all pistols until the last few years of our period, most carbines until the 1770s, Sea Service muskets until the late 1780s, and most other muskets until the 1750s, were made for the Ordnance from ash, ground to the correct diameter and taper.

The manufacture of bayonets and iron (or steel) ramrods involved the forging and welding of both iron and steel into the finished product. The socket and shoulder of the bayonet were forged of iron, and hand-filed to an internal gauge-diameter. They were hand-fitted to individual muskets at the time of issue from the Tower, by the Tower's internal workforce. The blade of steel, which had first been forged and then ground to shape, was welded to the upper area of the angled shoulder of the socket. During the era of the plug-bayonet the blades (being separate and mounted in turned wooden handles) were supplied to the Ordnance by the London cutler's trade, but with the introduction of the socket bayonet the entirely metal production passed into the hands of the Ordnance furbishers and latterly conventional contractors. Between 1724 and 1739 a small number of regiments in Ireland and the Guards Regiments carried iron mounted muskets fitted with iron rammers; these were supplied by conventional contractors. The Board credited William Grice of Birmingham with the introduction (to them) of the steel rammer, but no firm date is attributable.[10] From 1748 the steel rammer was in theory adopted for all infantry muskets, but it took more than a quarter of a century for all of the wooden rammered muskets to be called in or converted. The steel rammer was composed of an iron head, so as not to damage the iron barrels in loading, which was

scarf-welded to a steel body for spring and resiliency.

In the civilian guntrade the 'mounter or screwer together' referred to in the 1747 list above was as close as one could get to the modern conception of a 'gunmaker.' This firm brought together all of the components described and, using the pre-formed stock, put them all together. He did not, as a general rule, actually work on any part of the weapon except the shaping and finishing of the stock. Even such matters as the bluing of the barrel were left to other specialists. As time went on, even this trade was sub-divided into 'Gun Finisher' as well as 'Screwer Together,'so that the concept of a single gunmaker producing an entire weapon became even more incorrect. Within the Ordnance organization, the firms who 'made' the guns must be considered as the 'Rough Stockers' and the 'Setters Up', who are described below.[11]

* * * * * *

Having reviewed the general manufacturing processes involved in the production of small arms in the Eighteenth Century as applied by the civilian guntrade, we can now turn to a consideration of the specific system brought into being by the Board of Ordnance in the years from about 1710 to about 1730, by which they hoped to achieve a more certain and timely supply of a cheaper and better quality product than had heretofore been available.

In the Spring of 1710 Richard Wooldridge succeeded Henry Crips as the Small Gun Office's chief Furbisher (the title was officially made Master Furbisher in 1718) in the Tower. Subsequent occurrences suggest that this proved to be a major step towards the introduction of a more systematic, uniform and efficient production of small arms. Wooldridge, a gunmaker in his own right, first appears in the Ordnance records in the Spring of 1704 as an assistant to the View and Proof. He died in 1745, having served the longest of any Master Furbisher in the history of the Ordnance, and having probably been one of

the key people, like George Lovell in the Nineteenth Century, responsible for very greatly improving both the operation of the Ordnance and its product. Unfortunately the administrative records of the Board are missing between 1708 and 1715, and are very patchy until 1748, so that many features or activities which might otherwise be firmly attributable to Wooldridge must remain conjectural.[12]

The last large-scale production of muskets prior to 1714 occurred during 1710, in the course of which some 7250 muskets were produced for the Board by seventy-seven contractors.These were complete arms, at a cost of 20/- eạch There were, in addition, some 2700 musket barrels and 786 carbine barrels produced.[13] In the course of 1711 some 1700 musket locks were delivered in, while some 6300 musket and carbine locks were engraved, and almost 3000 barrels which had burst in proof were 'pieced and repaired' for Sea Service by one contractor, and 1750 new musket barrels were received. The only production was the 'cleaning, locking and stocking' of muskets for Sea Service, which was 'busy work' carried out by the usual wide spectrum of contractors, each with a small quantity to work on.[14] During 1712 1600 barrels for Sea Service had their 'heats taken, bor'd & breech'd' (see Glossary), the programme of cleaning, locking and stocking muskets continued on a much reduced scale, a few more locks were engraved and another 1000 barrels were 'piec'd and repair'd', and 300 new musket barrels were received.[15] No signficant recorded activity at all took place during 1713, save for a small batch of muskets, locks and barrels for the Irish service contracted for in August.[16] The years 1711 through 1713 may be seen as years of gathering and preparation. How much of it was conscious planning for a future production programme does not emerge from the scant surviving non-financial evidence.

In mid-1714 activity commenced which was not to slacken off until 1721. It began with a Warrant of 13 July for an issue of barrels to have their 'heats taken, bor'd

and breech't' for 1/- each; during the course of the year fifty-six contractors delivered in 5002 barrels, and under seven subsequent warrants of February and March 1715, a further 10,860 barrels came in. Ordinarily this type of barrel was relegated for the use of Sea Service muskets, but nowhere in the records is this fact mentioned in respect of these 15,862 barrels. It would appear that they were used up in the production of at least two of the succeeding patterns of musket which were fabricated during the next eight years.[17]

On 15 September 1714 comes the first real indication that a new era is dawning, when a contract for 4000 of'H.M. Land service Musquet barrels' are to be 'stock'd and sett up with his Majesty's Locks and brasswork according to pattern' at 8/9 each. Here is the first indication that the Ordnance is no longer calling for the production of complete arms, but is contracting for the assembling of arms from parts which will be supplied by the Ordnance. Forty-nine contractors took part in this production, of whom only nineteen received allotments of more than 100 arms.[18] The old system was not yet dead, but the first significant change had been made.

Early in 1715 new contracts are made. On 11 January 4000 sets of brass musket furniture are contracted for, 'according to Pattern', half each from Mathew Bagley and William Burgin. On 1 February 4000 'New Land barrels with brass heelplates Tricker Guards and sideplates and Bridle Locks To have the heats taken, bored and breeched' along with 8000 ordinary muskets, presumably all taken from store, and suggesting a change in the form of the breech of the barrel. Then, on 8 February 'Contracts are to be let to make up the number of Musquets in Store to 40,000, and for Pairs of Pistols to equal the number of Carbines, plus 2000 pair of Sea Service Pistols,' while on the same day Elias Cole received a contract to deliver 500 musket barrels by 31 March, and 1500 every three months thereafter until a total of 10,000 had been reached, all made 'to the Pattern'.[19] He had completed this work by

early 1717. [20]

On 15 March a further tightening up of the system took place when the Board ordered

> That for the future all small arms that shall want Stocking, Locking or both be not soe repaired in any of the Out Ports, but quarterly or half-yearly (as shall be most proper) sent up to the Tower. And letters writ to the Storekeepers at Portsmouth, Plymouth, Chatham and Sheerness to send up the repairable Small Arms accordingly.[21]

By this step the major re-working of arms was no longer to be done by Office armourers at the naval outports, but rather by the Tower workforce under the close supervision of Office inspectors. This would ensure a uniform examination of the arms, and a uniform method and quality of work in carrying out the refurbishment. It also spelled the end of the large 'busy work' contracts previously let to the London trade, substituting the Tower workforce.

Anticipating the new workload to be assumed within the Tower precincts, in March, 1715, the old Proof House next to the White Tower was taken down and a larger facility installed on 'Tower Wharfe', and in mid-April advertisements were placed in the Gazette and Daily Courant announcing the selling off of unserviceable stores, including small arms, at the Tower- this to make space for the influx of new arms.[22]

Amidst all the efforts at reorganization it is clear that the design of new arms was by no means settled; on 8 February Wooldridge had delivered to the Master General a Land Musket of the Old Pattern, as well as a new one 'as proposed' using bands instead of pins to secure the barrel. Then, on 14 April a contract was let to set up 1300 muskets 'with bridle locks'; on June 14 Richard Wooldridge was paid for several brass stock patterns for muskets, suggesting that a change had been made to the design since the contract of 15 September 1714; this possibility is supported by the Board's increased price offer, from 8/9 to 10/4 for the same type of work.[23]

The picture becomes even more confused when, on 13 September 1715 the Board contracts for muskets at 22/ each and pairs of (new pattern) pistols for 27/- the pair. However, these are completed with His Majesty's barrels and locks, for which deductions from the total prices are made, amounting to 6/6 per barrel, 3/9 for soft (unhardened) unengraved locks or 4/1 for soft engraved locks. It seems probable, though the evidence is not conclusive, that these varying price allowances refer to differing methods of accounting and book-keeping, and that the same pattern of musket may be referred to during this interim period. Twenty-three contractors delivered in 3500 muskets on this contract during 1716, of which 1760 were furnished by only six of the contractors.[24]

At this point the efforts of the Board are rudely interrupted by the Scottish Uprising now known as 'The Fifteen', which erupted in September, and was not suppressed until the following February. Despite recent production the Board felt impelled to resort to the import of additional arms, and 20,000 muskets were bought from the Dutch arsenal at Delft, of which 10,000 were to go to the Tower and 10,000 to Ireland. These were not newly made arms to an English pattern, but old Dutch arms in their stores. These were the last arms of a ready-made' nature to be purchased by the Board until the loss of Liege and the enormous demands from the mid-1790s. These arms proved of such bad quality and condition that the Irish Board refused to receive their allotment, and they appear to have been partially sold to the East India Company and the remainder broken up and the barrels used, after proofing, in future Ordnance production.[25]

Despite these alarums and excursions, the Board persevered with its rationalization programme, and on 20 March 1716 further important steps forward were taken when

> An open Contract is to be made for the Gunmakers providing Stocks for Land Service Musquts & setting up the same, according to pattern wth Iron work.
>
> Another [contract] for Stocks, & setting up Carbin's according to pattern with Iron work.

> And proportions for delivering to them from Time to Time, the Number of Barrls & Locks wth Iron worke, for the said Musqts & Carbines, they shall so Contract to sett up.26

This is the first surviving precise reference to the issuing of components from the King's Stores, even though there is a clear inference in the contract of 15 September 1714. This is also the beginning of the 'Iron Age' in Ordnance production, characterised by the use of iron furniture (and some iron rammers as well) on both Land and Sea Service muskets; carbines, despite the above reference, are always described as having brass furniture during this period.

Although Thomas Hollier, lessee of the Board's Armoury Mills at Lewisham, Kent, contracted for 5000 sets of ironwork for muskets, to the pattern, on 17 April, the year 1716 saw little evidence of progress towards new manufacturing contracts, and not until late 1717 did the build up of components begin which was to lead on to muskets being delivered into store from 1718 to 1721.[27] In July Wooldridge was sent to Birmingham to order further ironwork, and to 'shew ye workmen ye way to fitt Locks to the Mould.'[28] This is the first reference to the standardization of lock manufacture by the Ordnance, and it accounts for the great improvement in the uniformity and quality of Ordnance locks from this period onwards. William Caslon, of printing and type-font fame, replaced William Cookes as chief engraver to the Office, although Cookes continues as a supplier of barrels and locks.[29] In the course of the year Elias Coles delivered 4222 barrels at 6/9 each, and John Vaughan 648 locks 'according to ye new Pattern' at 4/6 each, but it was chiefly a time for completing the contracts of 1714 and 1715, and of reworking Sea Service arms. Problems over control in the manufacturing process were by no means entirely solved; in November, 1717, the Storekeeper Thomas Gardiner, and Wooldridge reported that many of the stocks supplied by the gunmakers had shrunk away from the buttplates-

indicating insufficient seasoning. The Board ordered the Stockers to repair the defects at their own cost, or risk not being employed again by the Office. Interestingly, as showing how matters were done at the time, and as an indication of the Tower workforce's activities, those stocks charged to the gunmaker William Sowerby (some 300) were repaired by the Small Gun Office workers, although Sowerby paid their wages for doing the work.[30] The working out of cost-effectiveness was also still in flux, as Gardiner reported that Wooldridge had cut 2/6 off the cost of stocking and setting up a pair of Land Service pistols, and the Board ordered that this be passed on in the next contract with the Gunmakers.[31]

Implementation of the new system made another major stride forward early in 1718. On 21 March it was

> Ordered That those of the Gunmaking Trade, who have behaved themselves well, be enter'd upon the Books of the Office, according to their Standing, being first recommended by Certificate from the Officers of the Small Gun Office, and Approved of by the Board. That the Assistant Viewers, shall be appointed, out of the eldest & best of these workmen, as the Board shall approve, & shall be allowed 2s 6d pr diem for so many days as they shall be employed therein, or in making patterns, or other Extra Work. That for the Encouragement of those, who have served longest & are best Qualified in the Gunmaking Trade, an allowance be made to 20 of them, of 12d a Day for the Holy Days, mentioned in the margin. [21 days]
>
> And whereas 'tis represented, that the procuring Double Security, proves difficult to many of them- Order'd for the future, that Single Security shall be sufficient, the Officers of the Small Gun Office, taking care they are well recommended.[32]

Here we have further control factors in the new system encapsulated in a single neat order. From now on, contractors will be chosen by officers of the Small Gun Office from a selected list of the best-behaved and most skilled men, and the officers have the responsibility of making certain that the list contains only well-qualified people. Bounties and the easing of bond requirements are

made liable to Office approval, and are based (at least in theory) on experience and skill.

As might be expected from such a limitation on their time-enshrined privileges, abuse from the gunmakers was not long in making its appearance. In August, 1718, a list of the Board's abuses was circulated, and articles attacking the Ordnance appeared in one or two anti-Government London newspapers. The Board was moved to reply in September that, of the charges made

> ...the Chief and Greatest Part are old Storey's, but it now appears, the whole Malice is Turn'd upon the Masr Furbisher, whose Integrity & Application in business has brought up the Office work to a higher Standard than ever, and the Detecting of Ill performances of ye work, has provoked the Company of Gunmakers to encourage this Rabble when at the same Time theyll do nothing for the Service effectually...[33]

The Board asked for the author of the charges to prove them, and name the persons making them. Just for good measure, and in a timely way, Wooldridge was accused of being a Jacobite! His value to the Ordnance is clearly seen in the nature of these complaints.

It was just at this point in time that production of the 'Pattern of the 10,000', the iron-mounted muskets, was to be put seriously in motion, and the Board having submitted its pattern arms, the Company sent in bids of 26/- for Land Service muskets and 24/- for Sea Service musekts. The Board responded by refusing to pay such high prices, and the gunmakers replied by offering to make others to a lower price. The Board told them they had tried that before and then had refused to make any guns to the agreement. The Master of the Company, acting as spokesman, said they could not do the work for even a half-penny less than 26/-, and the Board asked whether any features could be omitted from the pattern which would bring the price down to 24/- for the Land Service. The Master said certain frills could be eliminated, and promised to submit patterns which they could make for 24/- for the Land Service and 20/ for the Sea Service. The re

must have been a considerable increase in decorative features over the previous 22/- arms to warrant a 4/- price increase, but what the Company offered in return on 7 October disgusted the Board.

When compared with the Board's patterns, the butts of the stocks were formed by eye, rather than to gauges; the trigger plate was replaced by a simple square nut (as was usual on trade arms and Sea Service arms); the sideplate was flat rather than rounded in cross-section, and of very plain design, and let deeper into the wood thereby weakening it; the trigger guard was flat instead of being hollow cast, and thus much weaker; there was no tailpipe at all, and no sling swivels were provided; the lock mortise was largely cut away rather than fitted to the shape of the internal parts, greatly weakening the stock; and the barrels were not fine bored. The Company reckoned that the work left out amounted to 2/6, but they still wanted 24/- for the arm. There were further shortcomings on the cheaper Sea Service muskets which included no fastening at all for the barrel tang screw, no wood left in the lock mortise, a scanty breechplug tang which was of half-length and did not have the support of the sidenail passing through it, a much shortened buttplate comb lacking a tang, and no fine boring of the barrels. The Board compared the Company's patterns with one of the 20,000 Dutch muskets recently purchased, and concluded that they would stick to their own patterns and let those who wished to contract for them. Six gunmakers signed on to complete 1350 arms. Although the details are not recorded, it appears that some form of compromise was reached, for ten days after what must have been a very stormy meeting, the Board agreed to pay in ready money rather than by debentures in the course of the Office,

'...in consideration of the prices being advanced since.'[34]

It looked as though a difficult situation had been circumvented by compromise, but apparent sudden disaster reduced the problem to an academic level: on 21 October it

was 'discovered' that there was a deficit of £59,287.12.11 in the Board's available funds from the last Parliamentary grant, which 'put a stop to all Contracts and Warrants for Great Ordnance, small arms ...&c.'[35] Unfortunately there is a gap in the Minutes from the end of 1718 until the beginning of 1720, so it cannot be determined from the surviving records just how this crisis was sorted out, but the Bill Books and Treasurer's Ledgers do clearly indicate that despite the apparent absence of funds, production not only did not cease, it actually began to take on serious proportions from this time. The Dutch arms imported in 1715-16 were to be proved and surveyed to discover which could be made good (by the Small Gun Office workers) for Land or Sea Service, to have their barrels re-worked, or classed as unserviceable and broken up. Tower arms returned by the regiments would be repaired by the trade and used for Sea Service. Thirty-three contractors signed on, and had 2591 Land Service, 965 Sea Service muskets and 850 pair of pistols distributed to them on the basis of their past services, especially during the recent rebellion.[36]

Warrants and contracts made during 1716 and 1717 for components began to produce results from late 1717. Unfortunately, this is one of the few periods within the scope of this study when there is not a discernible break in production; it is therefore not always possible to clearly identify the relevance of each of the contracts made during this period. Thomas Hollier completed the first batch of 5000 sets of iron furniture for Land Service muskets by October, 1717, and produced a total of 9400 sets by the end of December, 1718, as well as 3000 sets of ironwork for Sea Service muskets in 1717 and 1718. Six contractors furnished almost 6900 musket locks, and Elias Cole was responsible for all but 100 of 6352 musket barrels. John Thompson supplied some 39,500 wooden rammers.[37]

Between the Spring of 1718 and the Summer of 1720 the first large-scale application of the newly organized

production system took place. During this time sixty-five contractors, contributing in various ways, produced for the Ordnance a total of 25,300 small arms. Of this number 9960 were the New Pattern iron mounted Land Service musket, our 'Pattern 1718'; 3480 were New Pattern iron mounted Sea Service muskets; 3466 were conventional brass mounted Sea Service muskets, and 200 were Extraordinary Sea Service muskets. There were also 1196 carbines mostly of a New Pattern, and 7000 pistols (3500 pairs) for Land Service.[38]

To produce this impressive total of arms covering at least eight different patterns, the newly devised division of labour came into play. Certain areas made more use of it than others; the most important weapon, the infantry musket, gained the major benefits, while lesser weapons, particuarly those for the Sea Service, continued to be made in closer conformity to the old system. In fabricating the 'Pattern 1718' muskets, the rough stocking operation was carried out by twelve contractors; the setting up was performed by forty-two contractors, of whom only seven also rough-stocked part of their production. In each of the seven cases this dual contribution was carried out very early in the production period and discontinued thereafter in favour of setting up only. The iron mounted Sea Service muskets were rough stocked by twelve contractors (all of whom also worked on the Pattern 1718s), and were set up by thirteen firms also from those who were working on the Land Service muskets. Turning to the other arms produced during this trial period, we find that the brass mounted Sea Service muskets were 'Stocked and set up' by fourteen contractors, of whom five did not participate in any other contracts at this time. These arms were thus rough stocked and set up by the same contractor, and in addition they supplied all of the furniture except the buttplate which, along with the barrels and locks, came from the King's Stores. Two of these five also produced the Extraordinary Sea Service muskets. A similar system combining rough stocking and

setting up was applied to the majority of the carbines, but the furniture was entirely supplied by the Ordnance. Pairs of pistols were dealt with by six contractors who performed the rough stocking operation and then the setting up of the pistols; a warrant for all the pistols was issued on 27 January 1719, and it called for both operations being carried out by the same contractor.[39]

During this period the fragmentary evidence which has survived suggests that Richard Wooldridge was continuing to strive for increased efficiency and cheaper production within the Ordance framework. In April, 1720, he reported that he can have carbine locks made for 3/7½, and pistol locks for 7/2 the pair, all 'to fitt moulds'; apart from introducing far greater standardisation in these two patterns, this represented a reduction in cost of 5d per pair of pistol locks. His efforts seemed to find favour with others besides his employers, and the Royal African Company asked him to view their arms, 'in order to bring the Gunmakers into a better method of working', which request the Ordnance approved.[40] The activities of the Small Gun Office workers were also being expanded at this time, and in January, 1721, they were ordered to make 500 carbine locks, as well as to clean and repair 3,729 of the Dutch muskets, as part of their coming year's work. Unfortunately this is one of only a tiny number of references to the technical activities of the Tower work force during our period. [41]

Production of the 'Pattern of the Ten Thousand' arms and associated secondary arms came to an end during the summer of 1721. Most of these arms have not yet been identified in modern collections so that there is little which can be said about any possible technical improvements over the arms made during the reign of Queen Anne. It is clear that a more elaborate barrel and a single-bridle lock which had to pass a 'go no-go' gauge were used in its production, and that the use of gauges to govern the uniformity of the major components were in general use to guide production. What had induced the

Ordnance to use iron for musket furniture does not appear in the records, but it continues to be used for muskets to be issued to the Guards regiments, being manufactured as late as 1735, and last issued in 1739. It may have been introduced as an encouragement to the Black Country industry, in an attempt to rely less upon London-based manufacturers. As a general article, however, iron furniture was abandoned after the Pattern 1718, and thereafter brass was used for all small arms furniture for the remainder of our period. The last of the iron-mounted arms were probably used up or replaced during the War of the Austrian Succession.

What may be considered as the final stage in the basic establishment of the new Ordnance-centred manufacturing system for small arms took place during 1722. This involved a pattern arm approved not only by the Master General, but by the King himself, and the incorporation of the bayonet as an integral part of a 'stand of arms.' George I's personal interest in the military establishment was, and is, well known, and this step represents a significant example of this active and detailed interest. The monarch's desire to standardize as well as improve the quality of the army's equipment is seen in the final praragraph of the following instruction, but it was to be many years before this aspect of the new programme was capable of being enforced. On 28 July

> The Master Genl signified his Majesty's orders to provide 2000 Small Arms with Bayonets according to the Pattern his Lordship delivered to the Surveyor Genl, which was approved of by his Majesty; and by Mr Wooldridge produced to the Board.
>
> And that all Collonells who have any new Arms made shall be obliged to make them according to the said Pattern, and proved and viewed by the proper Officers of the Ordnance.[42]

Note that colonels 'who have any new Arms made' are to conform to the King's Pattern and have them proved by the Ordnance; there is no suggestion that the colonels

must have Ordnance-made muskets. The colonels still have the option of having arms made themselves, but are now ordered to have them made to the single accepted pattern. Presumably this would not have affected minor savings or ornamentation to the colonel's taste, but the basic design should be followed. In any event, it appears to have been some time before the ruling was able to be fully enforced, in fact it seems reasonable to conclude that only the pressures exerted by the War of Jenkins' Ear and Austrian Succession finally bought the colonels of line regiments to comply.

In October Wooldridge was ordered by the Board to

> immediately sett in hand the 2000 Arms lately ordered to be made according to the Pattern sealed by his Majesty. ...And that Contracts be made with proper persons for providing the said Number of Barrlls and Locks, and for Stocking and Setting up the same.
>
> That a bill be allow'd and a Debenture made out to Lewis Barber Gunsmith for £27.18.0. for Brass and Iron Work Musquets with Bayonets made for patterns for his Majesty, according to the Directions of the Right Honble the Master General.[43]

Lewis Barber may thus be identified as the craftsman who produced the pattern arms from which the King's Pattern was chosen, but how much influence he, or Wooldridge, or the Master General, may have exerted upon the designs, and the one chosen, is not known. The muskets produced by Barber were described as twelve 'long Iron work Musqts with Bayonets' at 30/- each, six 'short Brass work Musqts with Bayonets' at 28/- each, and one 'long Iron work Musqt with Bayonet' at 30/-.[44] Judging purely from arms subsequently manufactured, the King chose one of the brass mounted muskets, but with a long, that is 46-inch as opposed to a short 42-inch, barrel. The most puzzling feature of this episode which in theory put the finishing touches to the new system of manufacture, is that there is no evidence of the 2000 arms mentioned actually being produced. There is no record of musket production, or even of components contracts, between 1722

and June, 1726.

During 1723 a number of deliveries of complete muskets with bayonets, as well as carbines and pairs of pistols were paid for by the Ordnance on behalf of several regiments. They would presumably have passed the King's Proof at the Tower prior to being issued. The cost of the muskets was much less than the 28/- to 30/- suggested by the pattern arms, and if several surviving examples of muskets by these makers apparently made during these years may be taken as typical, they do not conform to a single pattern, and are found with either brass or iron furniture. But it must be admitted that there are too few examples known from this period to draw any firm conclusions.

The first of these deliveries came from Joseph Farmer of Birmingham, 190 muskets complete with bayonets for 24/- each. The next was from James Freeman of London, for a further 190 muskets and bayonets also at 24/- each, for Maj. Gen. Sabine's regiment. The next two orders were for a variety of arms to be distributed amongst several regiments: Lewis Barber delivered 480 muskets and bayonets at 24/- each, 27 carbines at 21/- each, and 507 pairs of pistols at 26/- the pair, along with cartridge boxes and 24 drums, for issue to the regiments of Brigadier Gore, Col. Kerr, Lord Carpenter, Col. Campbell and the Duke of Bolton; Joseph Clarkson of London delivered 240 muskets and bayonets, with cartridge boxes, 240 pairs of pistols and 12 drums, at the same prices charged by Barber, for the use of the Earl of Stair's and Col. Churchill's regiments.[45]

Three smaller orders with no ultimate destinations specified followed early in 1724, two for 24 carbines and 24 pairs of pistols each, from Richard Sinckler and Thomas Phillips, and a final delivery in 1725 from Lewis Barber for 9 carbines and 9 pairs of pistols. This represents the entire small arms business of the Ordnance during these years as recorded in their Small Arms Books.[46] Since there are no minutes or other correspondence for this

period, no explanation for this virtual vacuum in production can be documented.

From its presumed origins sometime in the 1710-14 period through a gradual application of its various stages, a new procedure for the production of military small arms has been introduced by the cessation of production in 1721. In 1727 the system was to be brought into operation from a 'cold start', but before dealing with this next period of production- perhaps the most orderly and comprehensible to occur during our period- we will first examine the system itself as an administrative structure. Plate 1 gives a graphic representation of the procedures involved, and their sequence.

* * * * * *

It has already been shown that in altering the methods by which small arms were manufactured for and supplied to the Board of Ordnance, the Board itself initiated the changes, and put itself at the centre of the entire complex of procedures to be followed, asserting its influence from the beginning to the end of the process, with frequent checks and inspections throughout. It seems reasonable, therefore, given this new and positive position of the Board, and for both clarity and convenience of reference, to call this new system the 'Ordnance System' to differentiate it from the previous looser system which had no real centre of influence, but was rather a shared initiative between the Ordnance, the Gunmakers' Company and the Birmingham trade.

The stimulus for initiating military small arms production might come from one of two main sources, the armed forces or the Board itself, or from a third though less important source, another department of Government. In the case of the armed forces the initiative would be in the form of a request for arms for a regiment which was newly raised, or for an augmentation to an existing regiment, or for one whose weapons were worn out in

SMALL ARMS PRODUCTION SEQUENCE (1728-1783)

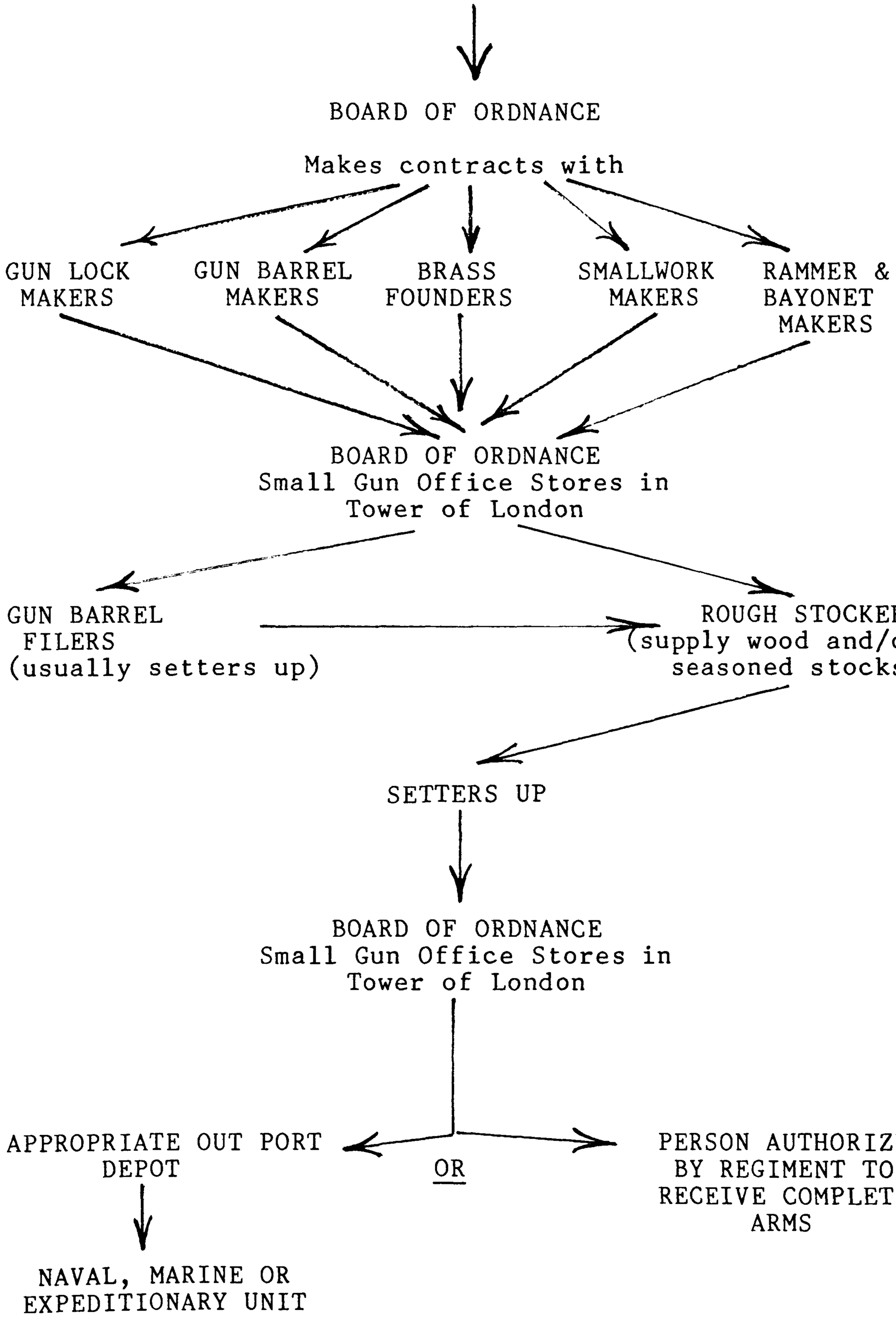


PLATE 2.

service, lost or irrepairably damaged in combat. The small arms complement for the Establishment of a given ship might also require replacement after long service or loss. A government department, such as the Board of Trade, or a Secretary of State, might require weapons to be furnished to an ally; or to a colony for its defense, independent of any arms which might be required by regiments stationed there. The Board's own officials might find as the result of an inspection of the stores that the numbers of a particular type of weapon were below an acceptable level and require new production to meet the level. The numbers and types of arms in store always varied widely due to incoming arms from regiments or paid-off ships, captured enemy small arms of all sorts, and the disposal at public vendue of old stores no longer considered serviceable.

Once a request for arms had been accepted by the Board the first step was to determine whether the necessary components were already available in store for the manufacture of the required arms. If they were, then warrants were issued to the 'standing gunmakers' to rough stock and set up the specified number, along with the required wood, and other components. If they were not, then the process was more complicated.

Assuming that there were no components for a given type of arm already in store, the clerks to the Storekeeper would write letters to the standing contractors for the various components (barrel makers, lock makers, brass founders, ramrod and bayonet makers, smallwork makers, rough stockers and setters up) to ask in what time and at what price they would agree to deliver the required number of pieces. There was an official Price Book kept by the Board in which the prices agreed by each contractor were entered, and such was the attitude in the 18th Century that, once agreed, a price did not automatically increase with the next contract. A new pattern object, requiring new moulds and gauges, would usually bring a slight increase in price, but this might even be lowered after initial costs had been covered. The

contractors would reply to the Board's enquiries and any differences would normally be quickly adjusted to mutual satisfaction. Warrants would then be made out to each contractor for a proportion of the required amount, with delivery variously specified at anything from six weeks to six months.

The manufacturing processes described on pages 29-33 would then be carried out by the contractors, sub-contracting amongst the trade as necessary. The details of how each contractor operated have not survived, and must be inferred from the Board's infrequent references to them, or from the results. Some contractors had difficulty in obtaining the required number of workmen for their allotments, especially if the chartered trading companies were issuing contracts for arms, or if it had been some years since Ordnance work had been carried out. This usually called for a rise in the price allowed by the Board for the affected component, with resultant delays while the amount was settled.

Gun barrels would be 'viewed' or inspected at the maker's premises by Ordnance Viewers who at times of lengthy contracts due to a war,(and from 1755 onwards) were usually resident in Birmingham.The view consisted of examining the bore from end to end with a rod-gauge; checking the spacing and placement of the loops on the underside, and of the sight at the muzzle, and also to see that they were properly brazed on; and the size of the muzzle was verified with a socket gauge for the fitting of the bayonet.[47] If they passed this inspection, they would be marked, and then sent to the Tower for proof. On average about 10% of barrels failed to pass the View and were rejected. During our period the Tower proof for muskets used a .751" lead ball, (.693" for service), for carbines .650" (.615 for service), and for pistols .550" (.517" for service), with approximately double the service charge for a proof charge.[48] After proof the barrels were left to lie for two days, to allow any flaws to be made obvious by rusting. If on examination no flaws were found,

the breech was then stamped with the King's proof mark, a pair of crossed sceptres beneath a crown, and with the view mark, a crowned GR with a Broad Arrow beneath. This second mark also doubled as a Government ownership mark for barrels. The barrels were then thoroughly cleaned and burnished, and if found entirely satisfactory a final viewer's mark of a crown over a number was stamped on the top of the breechplug tang.[49] The barrels were then taken into store to await issue to the rough stockers.

The manufacture of gunlocks for the Ordnance is more difficult to describe with certainty, because two distinct systems were employed throughout much of our period. In one the locks were supplied in a fully complete and finished state, with the lockplates engraved and hardened, while in the other the makers sent the locks to the Tower in the 'soft state' to be engraved, and then either hardened by the lockmakers in the Tower, or returned to the contractor for hardening. In 1756 the shape of the lockplate was simplified and the internal parts subjected to much closer gauging in the course of manufacture. Until 1764 the name of the lock contractor was engraved across the tail of the lockplate along with the date the lock was manufactured. After 1764 all locks were engraved TOWER in this position. However, many locks are found today with TOWER as well as a pre-1764 date, and these are thought to have originated as locks sent in the soft state to the Tower and engraved and hardened there. The contractor's name or initials would still be stamped on the inside of the lockplate.What determined which system was to be used for a particular contract is not clear from the records.The locks would be inspected prior to despatching from the contractor, to see that each part fit the gauge, that the springs worked well together, that the face of the hammer was properly steeled and would then be marked with the inspector's crowned numeral on the inside of the lockplate, and struck by the inspector with a crowned Broad Arrow on the outside of the lockplate below the pan, as a sign of acceptance and Government

ownership.[50]

After their general introduction for infantry use in 1748, the steel ramrod was subjected to a rigorous inspection by fixing it in a stand on the ground and bending it in various directions, to see if it would return each time to a perfectly straight line. It was then dropped from a height upon an anvil, head-first, and if the metal rang properly it was considered sound, and was struck with the inspector's crowned numeral below the head.[51] The Ordnance were not responsible for the threading of the tip to take a worm and ball-drawer; this was considered a regimental responsibility, even though rammers were engraved prior to issue by the Ordnance at the head with the regimental company and rack numbers.[52] Judging from surviving specimens, the majority of rods were not threaded, and reliance was presumably placed on regimental armourers for internal barrel work.

Socket bayonets came into general use after 1722, and their production was confined to a very limited number of makers until 1778 when the Birmingham trade took over their production. Thomas Hollier, lessee of the Armoury Mills, Lewisham, Kent, enjoyed a virtual monopoly of bayonet production between 1727 and his death in 1754. During this time he supplied some 227,000 bayonets for Land and Sea Service muskets, and carbines. From 1727 to 1730 William Huggins supplied a further 21,000 musket bayonets. From 1754 until 1778 bayonet production was in the hands of William & Edward Loxham. Bayonet scabbards were a separate item supplied by the accoutrement makers, Peter & James Esdaile throughout our period. At the conclusion of its manufacture the bayonet was subjected to several tests by way of inspection. The first involved gauging to see that the socket was of the correct diameter, and that the length of blade and its width at the shoulders were to size. It was then checked for the temper of the blade by attempts to bend it, and then struck at the neck on an anvil to test the welding and strength at this vital point. If all these tests were

passed the usual crowned numeral was struck into the base of the blade just above the neck, and the bayonet was ready for shipment to the Tower. Final fitting of the bayonet to a particular barrel was carried out either by the setters up, or by the Small Gun Office workforce, depending on the circumstances at the time. If the piece were intended for issue to a specific unit, then the unit designation and a rack and gun number would be engraved by the Office engravers on the socket of the bayonet, to match the markings on the barrel and escutcheon of the arm.[53]

Brasswork, to judge from examination of surviving examples, was inspected, but no details of the types of examination have survived. Land Pattern furniture would have been gauged for size and shape, although Sea Service furniture was filed to shape at the time of setting up. There may also have been a test for brittleness for furniture cast from virgin brass.

Each of the above components was supplied by contractors in different branches of the guntrade, located primarily in the Birmingham area. Finished and inspected components would be sent by road and/or canal (a journey of about nine day's duration) into store at the Tower. After 1804, when the assembling of complete arms by the Birmingham trade again became a part of the system, Ordnance storehouses and resident inspectors eliminated this journey for the components destined for assembly in Birmingham.

On reaching the Tower the Storekeeper's clerks accounted for the various items arriving and they were then distributed into the appropriate bins, or made ready for immediate shipment to the contractors for the next stages of production, the woodworkers.

In the civilian guntrade the operations of rough stocking and setting up were considered as one, but in the interests of detailed inspection at both stages of manufacture, the Ordnance divided it into two distinct operations performed by different firms. From 1729 until

1769 rough stocking, as well as the supplying of most of the walnut stock wood, was handled by the firm of Richard Waller, who was joined by his son James in 1755. In 1769 the Wallers, over their strong objections, were joined as rough stockers by Joseph Loder, replacing the elder Waller who had just died.[54] To the Ordnance rough stocking meant the shaping of the stock blank to its finished outline, fitting the barrel and the lock into the stock, and boring the ramrod channel. At this point the first inspection occurred, to see that lock and barrel were correctly seated and that the various cross-sections of the stock were to gauge. The wood itself was examined for soundness and lack of any cross-grain, cracks or flaws. The barrel was removed and the bedding checked, and the stock was struck a smart blow on the butt, and let fall to the ground to see if it 'sounded' right. If these tests were passed the inspector struck his crowned numeral in the rammer channel beneath the loop for the sling swivel.[55] In theory, and often in practice as well, the rough stocked arms were now returned into store at the Tower before being issued to the Setters Up.

The final operation in the Ordnance process was known to the Ordnance as Setting Up. This combined several operations as understood in the civilian gun trade, which included the screwer together or assembler, gun finisher, furniture polisher, gunstock finisher, stainer & varnisher. Under the tightly supervised Ordnance system this was divided up into several stages, with inspections between each stage. In the first stage the rough stocked arm had the brass furniture fitted to it, along with sling swivels or ring-bar as appropriate, and the holes drilled for the various pins which secured the furniture and trigger. At this point an inspection determined that the fitting was properly done and that the inletting of the brass and the drilling had created no splits or cracks in the stock. If the piece passed this inspection, a second crowned numeral, below the first one, was struck in the ramrod channel. The piece was then returned to the workmen

who polished all of the brasswork, and final-finished the stock by smoothing it to lay the grain, stained and oiled the wood. A further examination to see that these operations were done properly was then carried out, and if successful a third crowned numeral was struck in the rammer channel, below the earlier two marks. The arm was now taken to the Finishing Viewer in its completed state, and several examinations were carried out by this inspector: first, the pins were inspected for fit and the inside of the lock and the lock mortice; the barrel was also removed to check the fit of the pins and the soldering of the loops. If these were satisfactory the Viewer stuck his crowned numeral in the stock just below the lower tang of the trigger guard. Then the entire arm was inspected overall, and if found correct a second crowned numeral was struck below the first one (the same number).[56] The process known as 'filing fit for stocking' by which the outside dimensions of the barrels were reduced to their final configuration and measurements by draw-filing to a set of gauges, was usually performed by the setters up rather than the rough stockers, as a separately billed process. Why a process so clearly related to the earlier and more basic process should have thus been separated from it is not clear, unless it was due to the fact that the rough stockers dealt primarily with wood, whereas the setters up were often skilled with both wood and metalwork, and presumably could work to finer tolerances.

The arm was now complete, and ready for packing up and shipping to the Tower. Deliveries seem to have depended upon a number of factors including the urgency of demand from the Board, the amount of storage space available to the contractor, the distance from his workshops to the Tower, and the means of conveyance used. Judging from the dating of the bills, made out very soon after the arrival of the arms at the Tower, deliveries were generally monthly. When the arms arrived at the Tower they were received by the Storekeeper's clerks, and having

been noted down and a receipt issued, they were struck on the right side of the buttstock with the Storekeeper's stamp consisting, until the 1780s, of the Royal Cypher with a crown above it; beginning in 1786 a date was added below the cypher, but this date was not changed until the particular stamp was either broken or worn out. Dated Storekeeper's stamps cannot be used as a precise indication of when a piece was taken into store, except that the year shown will indicate a 'not before' date.

The weapons were now completed and in their racks in the Tower of London, ready for distribution to the troops and ships of HM forces, or to garrisons at home and abroad, a process which is dealt with in Appendix 2.

* * * * * *

It was during the period of general inactivity that the Board made its first experiment with an article of great practical value to the effective use of the musket in combat: the steel rammer. Unfortunately the experiment was implemented partly through the Small Gun Office workforce and partly by the Irish Board of Ordnance at Dublin, so that what little we know of the operation must be pieced together. The timing of the several events is such that it is even possible that the steel rammer was to be a part of the two thousand arms specified in the orders of July and October, 1722, but there is no documentary evidence to substantiate this suggestion.

The wooden rammer was cheap, easily made, fairly simple to replace, and lightweight, all desirable features in a military arm. But it was also extremely fragile, and when clumsily or hastily used, or with a powder-fouled barrel creating resistance and requiring undue pressure upon it, it would easily snap in two, leaving the soldier with no means of loading his weapon. It was also liable to swell during damp or wet weather, and become impossible to withdraw from its pipes. Despite the fact that from 1707 a

tapering tubular collar replaced a plain nail as a cover for the head of the ramrod,[57] it remained absolutely useless as a cleaning implement, removing a vital maintenance operation from the hands of the soldier. While these shortcomings could be tolerated where weapons were not frequently used, such as for cavalry and Sea Service, they were a severe handicap for the ordinary infantry soldier. Whether the idea of replacing wood with metal originated with some Irish officer, with someone at the Board in London, or was copied from Prussian experiments dating as far back as 1698, is not revealed in the records. Certainly the Prussian army, at the instance of Prince Leopold of Anhalt-Dessau, had adopted the heavy iron rammer in 1718, and during the mid-1720s it was being introduced into regimental service; it seems very likely that the inspiration for experimenting with it in Britain may well have stemmed from these developments.[58]

Sometime before August, 1724, the workers of the Small Gun Office had converted about 1000 muskets of the 'Pattern 1718' (or Pattern of the 10,000) from wooden rammers to use steel rammers. This had been accomplished by rivetting a small steel spring on the inside of the tailpipe to hold the new thinner rod in place, and by fixing (presumably by soldering) a thin thimble or collar of metal inside the mouth of the upper rammer pipe to prevent the rod from rattling too much. Someone at the Irish Board of Ordnance wrote to London to ask whether steel rods could be fitted to some of their muskets, and Richard Wolldridge replied on 4 August that they could be converted in the same manner as had already been done at the Tower. It appears that 680 muskets were intended for this conversion in Ireland.59

Apparently the steel rammer met with approbation in Ireland, for on 9 May 1726 a Royal Warrant was issued for sending 2000 muskets and bayonets with steel rammers to Ireland, at a cost of 32/- each, for the service of ten regiments [60]. By late 1726 there were a number of specific warrants for the issue of such arms to several regiments

on the Irish Establishment including Newton's,Disney's and Wetham's; early in 1727 there were further warrants for steel rammered muskets to Robert Murray's and Col. Duburgany's regiments. These warrants accounted for 1620 of the 2000 mentioned in the warrant of 9 May.[61] Lacking further detailed evidence it must be assumed that these arms were English-made iron-mounted Pattern 1718 muskets converted to steel rammers and sent to Ireland.

At the same time as the Irish Establishment was receiving steel rammered muskets, the Guards regiments in England were also being so equipped. It may well be that the intention was to use the Guards, with their normally undispersed stations and frequent drill, as the basis for the experiment with steel rammers in England. Under a warrant of 31 July 1724 the 1st Foot Guards were to receive an entire new set of arms (1260 muskets) and this may have marked the beginning of their new equipment, and also provide an explanation for the conversion of the 1000 muskets to steel rammers referred to by Wolldridge in his letter of 4 August. By the augmentation of 15 September 1727 a total of 256 men were to be added to all three Guards regiments, and they were to have steel rammered muskets, indicating that by that time the parent corps already had them.[62] The last recorded manufacture of iron mounted and steel rammered muskets occurred in 1735, when Richard Wooldridge set up 640 for an augmentation to the Foot Guards. The Guards appear to have lost their steel rammered iron mounted muskets during the 1739-41 general re-armament, and when they were re-issued with steel rammered muskets in 1749, they had the conventional brass mountings. The steel rammer was to remain a limited issue item until the time of the Seven Years' War, during which most infantry regiments and some militia regiments were equipped with it.

Early in 1727 there were several large augmentations made to the dragoons and the troops in Ireland, as well as the raising of six independent companies for service in the Highlands, and new arms for the garrison at Gibraltar.

These demands apparently could not be met from arms already in store, and the old system of taking complete arms from the gunmakers was resorted to. Some 9900 muskets and 2000 pairs of pistols were required. Orders for dragoon arms were dealt with by several gunmakers: Lewis Barber supplied 832 muskets & bayonets and 856 pairs of pistols; Joseph Clarkson supplied 416 muskets & bayonets and 427 pairs of pistols; Joseph Farmer furnished 207 muskets & bayonets; James Freeman supplied 414 muskets & bayonets; and Richard Sinckler furnished 81 muskets with bayonets. These were all iron mounted arms, costing 26/6 each complete; given that the subsequent pattern was priced at 32/6, we may conclude that they were of a different, perhaps a regimental, pattern.[63]

The Board was about to enter upon another period of large-scale production, which had its beginnings in various components contracts made throughout 1727. Chief amongst these were furniture contracts. Thomas Hollier delivered in 3000 sets of iron musket furniture, while Mary Burgin supplied 2000 sets of brass musket furniture, and Peter Cooke furnished 3500 sets of brass rammer pipes and rammer tips. Also received into store during the year were 3000 barrels from Elias Cole, another 1000 from Edward Cookes and 500 from Joseph Farmer. The only arms production to be recorded during 1727 was 1000 iron mounted muskets and 1000 brass mounted muskets set up at 6/6 each by Charles Pickfatt, who was to loom large as a Setter Up for the next twenty-one years; since the charge for setting up the subsequent pattern was 8/6, we may assume that these were not of the same pattern as the large scale production which was to follow.64

Between January and August 1728, Richard Wooldridge was visiting the many contractors with pattern arms for their inspection and guidance.[65] From this it seems reasonable to conclude that the materials being assembled were for a new and definitive design of musket, and with the benefit of hindsight in studying the production which was to follow, it seems justifiable to identify this new

pattern arm as the King's Pattern of 1728. Its most distinctive features were the style of its brass furniture, the shape of the stock, and the design of the barrel. [redacted]. The Pattern 1728 musket was fitted with a .76 calibre 46-inch round iron barrel with ornamental turning at the breech, secured to the fore-end by three double barrel loops and the screw for the upper sling swivel. The double loops served also as bases for the pins which secured the rammer pipes, but they were more costly than the single variety and were discontinued in the early 1730s. The foresight is an iron rectangle measuring about 1/4" x 1/8" brazed about two inches from the muzzle, which acts primarily as a stud for fixing the bayonet. The lock was of the single-bridle variety, representing a considerable improvement over the Pattern of the 10,000 (Pattern 1718) design, with a rounded surface to the lockplate and cock. The lockplate measures 6 7/8" x 1 3/16", and the rear portion of the plate angles downwards in what is usually described as a'banana' outline. The finial of the feather-spring is a trefoil pattern. The lock is fitted with a long sear spring, and only the sear screw comes through the lockplate at the tail.The comb of the cock is broad and when viewed from the side, very thin and curled forward at its tip. The top jaw, viewed from above, is nearly circular in form, and is engraved with the two narrow lines also found on the edges of the lockplate, cock and back of the vertical section of the hammer. Forward of the cock the lockplate is engraved with the Royal Cypher, a crown over GR, and the name of the lock contractor or TOWER and the date of lock production are engraved across the tail of the plate. Most of the brass furniture would remain unchanged in its design for the production life of the Long Land Pattern musket, but on this first production type the trigger guard is of a design which was to last only until the early 1740s, when it was replaced with a simpler, more robust pattern. The upper or front finial is very ornamental, and the two terminals of the guard bow are

pinched-in and very thin, in imitation of current fowling piece furniture. The base for the lower sling swivel screw is very slight. The tang of the buttplate tapers gradually as it progresses up the comb of the butt, in three steps, terminating in a tapered section with a ball at its tip. The sideplate is countersunk for the two sidenails (lock screws) and is well rounded in contour, with a tail extending to the rear of the rear sidenail. The thumbpiece inlaid on the top of the wrist or small of the butt, is held in position by a screw passing through the stock from the lower tang of the trigger guard. The oil finished walnut stock terminates at its upper end without any form of reinforce or cap, and the fore-end is very thin, light and weak throughout its length. The butt is very thick in cross-section, and the handrail portion along the sides is shaped to leave a curved upper section to the high comb of the butt, the top of which is fairly broad and well rounded. The flat areas into which the lock and sideplate are inletted, terminate at front and rear with raised elliptical aprons, and there is another such apron surrounding the barrel tang. The tapering ash ramrod which is capped with a tapering brass collar, is held in position by three short brass barrel-shaped pipes and a tailpipe with a long ornamental finial. Just where the tailpipe finial is inlet into the fore-end of the stock there is a bulbous swelling to improve the grip of the hand at this point. The overall length of the arm is just under sixty-two inches, and its weight about ten pounds twelve ounces. The bayonet has a triangular blade about seventeen inches long and 1 5/16" wide at its shoulder, and a tubular socket about four inches long, with an zig-zag slot in which the foresight is anchored in fixing the bayonet. The blade and socket are connected by a curved elbow, the base of which, where it joins the socket, is formed with a raised apron. The bayonet weighs just over a pound. The weight of the arm complete with its bayonet is therefore just under twelve pounds.[66]

During 1728 and 1729 components continued to flow

into the King's Stores at the Tower, and there was some setting up of arms, as well as deliveries of complete arms under previous contracts. Thus we find that Thomas Hollier delivered in 19,550 sets of brasswork for muskets and 1168 sets of ironwork for muskets; as well as 500 sets of carbine brasswork and sets for 500 pairs of pistols. Elias Cole delivered in 9726 musket barrels and 500 carbine and 500 pairs of pistol barrels, as well as 1050 musket locks. Edward Cookes delivered in 1600 musket barrels and 2500 musket locks. Joseph Farmer delivered 4400 musket barrels and 1500 musket locks. John Vaughan delivered 2000 musket locks, and John Farlow an additional 600. By the end of 1729 there are 15,726 barrels and 7650 locks and 19,550 sets of brasswork ready for assembling into the Pattern 1728 musket.[67] During 1728 a further 3600 Land Muskets with brass furniture were set up at 6/6 each by seven of the 'old' gunmakers, and 500 with steel rammers at 7/6 each by Thomas Green. Of complete arms, 208 muskets & bayonets were delivered by Richard Sinckler at 26/6 each, along with 213½ pairs of pistols at 26/- the pair, and Joseph Clarkson supplied 416 muskets & bayonets and 427 pairs of pistols at the same prices. The only assembling of arms during 1729 was the rough stocking of 2846 muskets by Richard Waller at 2/4 each and the setting up of 500 iron mounted muskets by Charles Pickfatt at 6/6 each. [68]

In 1730 production of the King's Pattern 1728 musket commences, and a pattern of production emerges which is to remain unaltered until 1742, although a number of new components contractors appear during this period. Basically production is in the hands of three contractors: Richard Waller rough stocks, and then Lewis Barber and Charles Pickfatt set up the arms. Each setter up delivered on average 250 muskets per month until the Spring of 1737 when a break occurs for the production of some Sea Service arms; when Land Service production is resumed in the autumn of 1738, monthly deliveries increase to 400 muskets. From the Spring of 1730 when setting up begins, until Spring of 1737, Waller delivered 37,350 rough

stocked muskets, and the two setters up delivered a total of 25,371 Pattern 1728 muskets, with Barber exceeding Pickfatt's deliveries by 2751 arms. During this same period Waller delivered 500 rough stocked carbines and 6500 pairs of pistols, and the two setters up delivered a total of 500 carbines, 3450 pairs of Land Service pistols, and 500 pairs of Sea Service pistols.[69]

During this same period several new firms appeared as components contractors. Edward Jordan of Birmingham appears in March, 1733 as a supplier of barrels and locks, and within a few years replaces both Cole (whose last delivery was in May, 1734) and Cookes (who disappears after September, 1737); in August, 1736, John Smith received his first warrant as a supplier of locks, and William Clarke appears from October, 1739 to July, 1742 as a contractor for barrels and locks.

By the mid-1730s relations with Spain were becoming increasingly fraught, due to the smuggling operations of English merchants in the Spanish Caribbean and the increasingly sharp retaliations of Spanish guarda costas. There had been no recorded delivery of Sea Service arms since the Spring of 1721, until, in September, 1734, Hollier delivered 1700 sets of Sea Service musket furniture and 2788 Sea Service bayonets. It was not until November, 1737, that Waller rough stocked the initial 1000 Sea Service muskets, followed by a further 4178 by July, 1738, along with 497 musketoons. Between June, 1737 and March, 1738, Hollier delivered in a further 5972 sets of Sea Service furniture as well as sets for 1000 pairs of Sea Service pistols. The setting up of Sea Service arms began in March, 1738 and was largely completed by March, 1739, by which time Barber and Pickfatt had delivered in 2900 muskets, 600 muskets with Dutch barrels and locks for Sea Service, and 336 musketoons. From these figures one must assume that the King's Stores were already quite well supplied with Sea Service arms. In July and August of 1740 a further 2000 muskets from 3000 rough stocked, were set up.[70]

There had been no pistol production since a mere 500 pairs had been set up by Pickfatt in May, 1731. This may be at least partially accounted for by the longer service life of seldom-used pistols, and by the fact that most of the cavalry and dragoon regiments which carried them were stationed in Ireland and had their arms made for them privately, or by the Irish Board of Ordnance. At this period there was only one type of Land Service pistol carried by mounted troops, with a 12-inch barrel, and brass furniture. Waller delivered into store 7000 pairs of rough stocked pistols between December, 1735 and December, 1738, and Hollier sent in sets of furniture for 6600 pairs of pistols during 1735. During 1736 and 1737, Barber and Pickett set up 3450 pairs.[71] It is likely that these are the last of the old style of pistol on which the buttcap was shaped approximately like a plain semi-hemisphere, and that the pistols produced from the Spring of 1740 were fitted with a new, more elaborate buttcap described as 'long ear'd buttcaps', i.e. with long tapering tangs running up each side of the grip giving greater strength.

By the late 1730s commercial interests and the political Opposition were pushing for a showdown with Spain, the one in hopes of additional trade, and the other looking to topple the Walpole Government which was committed to peaceful gains. George II and his ministers had been quietly and gradually increasing the size of the army during the 1730s by occasional and small augmentations, and these, along with colonial garrison issues, had eaten well into the stores of the Pattern 1718 muskets as well as older, Dutch, and reworked arms.[72] After the completion of the rather small quantity of Sea Service arms, production of Land Service arms was resumed at about the time of the declaration of war against Spain in September, 1739. A contract was made, with deliveries to commence in September, for delivering 1000 arms per month.[73] From this time until the end of 1741, when a number of new contractors were taken on to increase the output, Waller supplied 21,452 rough stocked muskets,as

well as 2347 described as 'part of the Pattn of the 10,000, balance with Dutch barrels', 413 wall pieces, and 1000 carbines and 1738 pairs of Land Service pistols which had been completed in 1737-8; Barber and Pickfatt between them delivered in 9590 muskets,(well under half those ready for setting up), 600 carbines, 200 wallpieces, and 600 pairs of carbine-bore Land Service pistols.[74]

Although the war continued for several years to be a naval one, it was considered necessary to bring the land forces to a state of wartime readiness, on the assumption that sooner or later France would come in. That the state of the armaments was clearly less than satisfactory was the theme of many complaints from regimental commanding officers during late 1739, and as a result of these many complaints an Ordnance inspection team of two competent gunmakers was sent to the various garrison towns around the country to inspect the arms of the regiments. The survey revealed that even within a single regiment there were apt to be several different styles of musket and/or pistol in the hands of the troops, and that most of them had been in issue since the late 'teens or early 1720s. The arms of several regiments dated from 1707-15, and many were not by Ordnance contractors. Four regiments of dragoons carried 'musquets with brass furniture, round double bridle locks, Sea Pattern, made at the Tower 1737-8, deliver'd at the last Augmentation', a puzzling description at best!The majority had plain- bridleless-locks, and five carried Pattern of the 10,000 arms. Almost all were in bad or even unserviceable condition.[75] The result was a virtual re-arming of the British army during 1740-1 (see Appendix 2), which wiped out the stores of the Pattern 1728 and brought about a renewed production of Land Service muskets which incorporated a number of technical and minor design improvements over the Pattern 1728, creating a design which, with a few additional improvements in subsequent years, served the British line infantry for the next half century.

Footnotes to Chapter 2.

1. See: Jean Boudriot, Armes a feu françaises: modeles reglementaires 1717-1836, 3 vols. (Paris, 1961,1963, 1965).

2. See: A. Wirtgen, Die preussischen Handfeuerwaffen: Modelle und Manufacturen 1700-1806, 2 vols., Textband (Osnabrück,1976).

3. See: M.M. Denisova, M.E. Portnov & E.N. Denisov, Russian Weapons, Russian text, (Moscow,1953) and: V. Fedorov, Evolution of Small Arms, Russian text (Moscow,1938).

4. See: J.L. Calvo, Armamento Reglamentario y Auxiliar del Ejercito Espanol, 3 vols., Libro 1 (Barcelona 1975).

5. For Austria see: A. Dolleczek, Monographie der k.u.k. oester.-ung. blanken und Handfeuer Waffen (Vienna, 1896); for Naples see: Sergio Ferrari, 'Armi di Napoli sulle Manifatture d'Armi Napoletane e loro produzione prima dell' unita d'Italia', Diana Armi (Florence, 1983), Oct., 20-23, Nov., 16-19, Dec., 24-27; for Piedmont see: F. Sterrantino, 'Le fabbriche d'armi in Piemonte nel secolo XVIII', Armi Antiche, 1978, (Turin,1978), 91-115.

6. e.g., WO 47/86, 325.

7. WO 55/343, 4 Aug. 1703, 7 Aug. 1703;WO 47/24, 408; WO 47/25, 498.

8. London Magazine, 21 February 1747.

9. G. Brumfield, 'The Production of Flintlocks Used on Colonial American Rifles: Raw Materials, Tools, and Technology' Journal of Historical Armsmaking Technology, vol. 1 (Friendship, Indiana,1985), 1-83.

10. WO 47/70, 14 July 1766, 42.

11. Apart from the specific references, this general description is based on conversations and correspondence with Wallace B. Gusler and Gary M. Brumfield of Colonial Williamsburg, James L. Jackson (Armourer to H.M. The Queen), Lynton S. McKenzie, Paul Sawney and H.A.R. Davies, each of whom is a practising gunmaker specializing in the fabrication of Eighteenth Century style firearms, and each a student of the technology of gunmaking of that period.

12. WO 48/42, quarter 1 April-30 June 1704; Tower Burial Register, St.Peter ad Vincula, May, 1745.

13. WO 50/17, passim.

14. Ibid.

15. Ibid.

16. Ibid.

17. Ibid.

18. Ibid.

19. Ibid.

20. WO 47/20A, 21,26.

21. Ibid., 39.

22. Ibid., 4 Mar. 1715, 34; 14 Apr. 1715, 53.

23. WO 47/28, 8 Feb. 1715, 36; WO 47/20A, 68, 80.

24. WO 47/20A, 94; WO 50/17, passim.

25. WO 47/28 6 Dec. 1715, 350; WO 47/20A, 6 Jan. 1716, 132; WO 47/29, 10 July 1716, 160; WO 47/31, 4 Sept 1718, 252.

26. WO 47/29, 66.

27. Ibid., 87.

28. Ibid., 172.

29. Ibid., 105, 163, 250.

30. WO 47/30, 19 Nov. 1717, 298.

31. Ibid., 262.

32. WO 47/31, 72.

33. Ibid., 2 Sept 1718, 247.

34. Ibid., 250, 284-5.

35. Ibid., 302.

36. Ibid., 271, 326; WO 50/18, passim.

37. WO 50/18, passim.

38. Ibid.

39. Ibid.

40. WO 47/33, 22 July 1720, 253.

41. WO 47/20B, 16 Jan. 1721, 25.

42. Ibid., n.p.

43. Ibid., n.p.

44. WO 50/18, 8 Sept 1722.

45. Ibid., passim.

46. Ibid.

47. WO 44/519. Testimony of John Marshall, Clerk & Paymaster of the Ordnance at Birmingham, to Court of Enquiry, 1824.

48. George Smith, An Universal Military Dictionary, article 'Bullet' (London,1779).

49. WO 44/519.

50. Ibid.

51. Ibid.

52. Bennett Cuthbertson, 'A System for the Compleat Interior Management and Oeconomy of a Battalion of Infantry', Chapter XIII, Article III, in Hew Strachan, British Military Uniforms 1768-1796 (London,1975),151.

53. WO 44/519; survey of Bill Books, 1727-1815.

54. WO 47/73, 10 Mar. 1769, 125.

55. WO 44/519.

56. Ibid.

57. WO 47/24, 9 June 1707, 482.

58. W. Eckhardt & O. Morawietz, Die Handwaffen des brandenburgisch-preussisch-deutschen Heeres 1640-1945 (Hamburg,1973), 25.

59. BL, Tyrawley Papers, Add.MS 23636, 4 Aug.1724, fo.7,9.

60. WO 55/348, 56.

61. Ibid., 7 Dec. 1726, 30 Dec. 1726; WO 48/51, 4 Jan. 1727, 29 Mar. 1727.

62. WO 55/347; WO 55/349.

63. WO 48/51, WO 55/348-349; WO 50/19.

64. WO 50/19.

65. WO 48/51.

66. Description based upon personal examination of examples in the collections of the Royal Armouries, H.M. Tower of London, and Colonial Williamsburg.

67. WO 50/19; WO 48/69-70.

68. Ibid.

69. WO 48/71-82, passim.

70. Ibid.

71. Ibid.

72. WO 55/349-50, passim.

73. PRO, State Papers, Foreign, 41/36, 28 May 1740. Hereafter cited as SP 41/36.

74. WO 48/80-1, passim.

75. SP 41/36, Jan.-Sept 1740.

CHAPTER 3

WAR AND PEACE, 1740 - 1755.

Despite the fact that the years from 1722 to 1739 had involved no serious commitment of British forces, despite the fact that Ordnance production seems to have proceeded entirely according to the wishes of the Board, yet the pressures created by the military build-up following the outbreak of the War of Jenkins' Ear in the autumn of 1739 soon demonstrated that the Ordnance System was not adequate. While it may have been cold comfort to those in charge at the time, it is clear that much of this failure was due to the general attitude of both officialdom and the tax-paying public towards the functions of government. The terms ad hoc and 'pragmatic'sum up this attitude; 'long term planning' was a concept unheard of in the Eighteenth Century, and while administrative structures were established and rules laid down for their operation, there still remained the basic approach to all situations which might arise: take it as it comes and deal with it according to the circumstances at the time. It would have been unthinkable to increase the charges to Government by increasing the monthly intake of small arms before a war actually broke out; augmentations and garrisons had been dealt with piecemeal as their requirements became known, and production had proceeded at a pace which kept the King's Store up to the level established by the ruling of February, 1715; in fact a'State' of January, 1739, showed more than 42,000 muskets of the King's Pattern then in store.[1] But, when the widespread replacement of arms was found necessary by the inspection carried out during 1740, on top of the decision of Parliament to raise ten regiments of marines rather than allow the more costly alternative of an augmentation of the regular army, the Ordnance was not entirely prepared. Of the 42,000 arms in store in January, 1739, some 28,000 had been issued by March of the following year, distributed mostly amongst twenty-five regiments, '...his Majesty having declared his

Intention that the Three Regiments of Foot Guards, and all the Marching Regiments of Foot and Dragoons should be entirely new Armed...'[2] and to five companies of Invalids, the Royal Artillery, six of the marine regiments, and to Ireland, America, Edinburgh and Minorca, as well as to the expedition to the West Indies.[3]

The attitude of the Ordnance is clearly reflected in a reply which they made in May, 1740, to some enquiries by the Master General regarding forthcoming production and the present state of supplies, and about the effectiveness of the contract of September, 1739, calling for deliveries of one thousand arms per month. By the date of this letter the arms in store were at a low point, and new components and arms had not yet begun to arrive in numbers. The feeling which emanates from this letter is barely one of concern, rather a desire to fully explain the situation and reassure the MGO that all is well:

> That where many persons are employed in such a manner, that Sickness, or any other accident happening to one might retard and hinder the other, we do not pretend to determine what quantitys may be depended on, or at what times, lest it should turn out contrary to expectation, but we cannot suppose that less than 3000 will be compleated by Michaelmas next, unless the want of Water should obstruct the same.
>
> Your Grace no doubt will recollect what an Interruption all sorts of business met with from the severity of the late Frost, how long it continued, and what damage was done to Mill Work & Engines of all kinds, which required time to repair & make good the same; notwithstanding which the Barrels, Locks, and other materials mentioned in the Inclosed account, have been made and delivered into Store since September last, and your Grace will be pleased to observe that We never allow less than 5 or 6 Months and generally more for the Stocks to Season, before we Issue them to be sett up, that is, before they are Compleated. ...

AN Account of Barrels, Locks & other materials provided and delivered into Store for making Land and Sea Service Musquets to the King's Pattern since September 1739 - Land Service:

Barrels	1130
Locks	2668
Rough Stocks	6000
Brass Furniture, Rough Setts	3000
Bayonets	3000
Swivels	3000

Sea Service

Barrels, Locks, Stocks & all materials of which 2500 are Stocked and of them- 668 are set up[4]	3000

Not only do the Board express no alarm, but undertake to explain to the MGO that they would not expect to be able to be explicit about future deliveries; having made their contract, they are now comfortably awaiting the results of it, and they wish to sidestep commitment to avoid possible future disappointment. They calm the MGOs mind with reminders of deliveries made in spite of damage to watermills and stoppages during the bad winter, and seek to further assure him by reminding him of the frailties which can overcome all human beings in the course of their labours.

Someone, however, seems to have been concerned about the supply of small arms, and informed the King, who ordered that a supply be obtained 'from Holland...to be made to the English Pattern which was accordingly sent...[5] and in June, 1740, appears the first evidence of negotiations for a supply of arms from Liège to supplement the domestic production. Robert Trevor, H.M. Envoy Extraordinary at The Hague replied to a letter from the Secretary of State, the Duke of Newcastle, informing him of the number of arms which may be obtained in 'some of the Towns of Flanders' and advises the Duke to send a 'proper Person ... with a Pattern of Arms, and fully

instructed upon the several Points mentioned in Mr. Trevor's Letter...'[6] There were several contracts which all appear to have been handled through a M. de la Faille of Liège, the first in November, 1740, and the last in October, 1745, resulting in the acquisition by the Ordnance of 46,000 muskets & bayonets and 18,000 musket barrels, all of these save 10,000 muskets & bayonets, contracted for in 1740 and 1741.[7] These arms were made to an English pattern, at an equivalent cost of between 18/1¼ and 18/7 each at a time when the English product was costing the Board 32/6. To date none of the arms made in Liège under these 1740s contracts have been identified. Although obtained with relative rapidity and with only a few technical difficulties, these arms were to prove an affront to many of the troops to whom they were issued, and most of them went ultimately to second-line and colonial forces.

Foreign purchases could be used to alleviate temporary shortages in domestic deliveries, but it was upon the home trade that the chief reliance remained. It would appear to have been fortuitous timing, but the outbreak of the war coincided with the exhaustion of the components production and assembly programme which had been in progress since the late 1720s. One of the results of this clearing out of the components bins was that the design of several arms was modernised, and in the course of the next eight years several new weapons make their first appearance. There was a break in the rough stocking and setting up of Land Service arms between the Spring of 1737 and the Autumn of 1739, during which time, as discussed on page 80, Sea Service arms were produced. This break applied also to the components contractors. William Clarke's first Land Service barrels, on a warrant of October, 1739, were not delivered until February, 1741; Hollier delivered one final batch of 2280 sets of brass musket furniture in December, 1738, and then no more until December, 1739; Edward Jordan's first deliveries of locks and barrels on a warrant of September, 1739, occur in late

March of 1740; after 1732, Joseph Farmer's next delivery of lock and barrels is not until May, 1741; John Smith's first Land Service locks appear in January, 1741; and Vaughan's first delivery of Land Service musket locks after July, 1737, is exactly three years later.[8] After an examination of muskets made on either side of this production gap, it is clear that before ordering new components for a resumption of production, the Ordnance took the opportunity to make a number of changes to the design of the components, and as with the gap which occurred in the mid- to late 1720s, this presents a justifiable opportunity to clarify the situation by assigning a model designation to the muskets produced to the new design. In accordance with the Ordnance tradition, established in the Nineteenth Century, we use the date the new design was ordered into production at the component stage, not the date on which the arms were first issued for service. The musket which was produced between 1740 and 1748 is therefore designated as the 'Pattern 1739.' This is based on the fact that Hollier's first furniture delivery occured late in December, 1739 (he was billed on the 31st) and that Waller delivered in his first rough stocked muskets clearly not of the old pattern in January, 1740, while Barber and Pickfatt did not deliver any set up Land Service muskets until Aug.-Sept. 1740. The double bridle lock, one of the main design features of the new pattern, first appears in the Spring of 1740. [9]

The two changes most noticeable between the Pattern 1728 and the Pattern 1739 muskets are the lock and the trigger guard. The double bridle lock appears in the Bill Books for the first time in March, 1740, although single bridle locks have been noted on muskets otherwise of the new pattern with dates as late as 1742 (see below). On this new design there is an extension forward on the outer edge of the pan (called the pan bridle) through which the pivot screw for the hammer passes, giving support to the more efficient and smoother movement of the hammer, and strength to that exposed part of the lock. The trigger

guard is made altogether heavier and simpler in design; the guard bow is now thicker in section and broad at each terminal, with a good thickening where the screw for the lower sling swivel passes through it, and an inward curl at its rear terminal for added protection against crushing. The finials are heavier and much simplified in outline. Apart from these two major changes, the stock carving was somewhat simplified by the elimination of the elliptical aprons at the front of lock and sideplate flats; those at the rear remained. ([redacted]).[10]

Production of the Pattern 1739 musket may be considered to have commenced with the delivery by Richard Waller of 2233 rough stocked muskets in January, 1740; these were followed during the year by a further 4819. Waller's total output of Land Service rough stocked muskets between January, 1740 and December, 1748 amounted to 109,284 not including some 4000 delivered in September, 1747 with single bridle locks, and various special patterns discussed below. Most of these late production single-bridle locks were probably the 1562 of this type turned in by Jordan & Farmer in July 1742, on a warrant of May of that year, probably for some special purpose lower-priced arm, (marine muskets?) and will be dated 1742. Beginning in the autumn of 1740 Barber and Pickfatt set up a total of 2800, of which 400 (in December) are described as having double bridle locks. There is little doubt, therefore, that some Pattern 1739 muskets will be found with single-bridle locks.Their total output of Land Service muskets set up between August, 1740 and September, 1748, amounted to (Barber 32,823, Pickfatt 30,238) 63,061. It is thus clear that, despite the Ordnance taking on additional setters up, these two 'old' contractors performed the majority of the work during the War of the Austrian Succession.[11]

This was not apparent to the Board at the time, and by the end of 1741 the number of rough stocked muskets delivered into store amounted to 21,452, while the number set up by Barber and Pickfatt was a mere 11,200, just over

half those waiting to be assembled. The Board apparently thought this was not good enough, and in June, 1742, issued its first warrant to a new setter up, William Birkell. A new contractor for locks and barrels, John Willet, received his first warrant in November, and during 1743 a further four setters up were taken on: Peter Gandon (March), Hewit Gluvias (July, who only delivered 250 arms), Edward Sale (March) and Nathaniel Trevey (May). These men, along with John Hirst, whose first warrant is dated in October, 1745, were to set up several thousands of arms by the end of the war, and Hirst was to become a major participant in Ordnance operations from the commencement of the next war in 1756. Three other contractors were taken on during this war, John Taylor as a setter up, John Wood for locks, and Tippin & Edge for complete arms, locks and barrels, but their contributions were miniscule. ([redacted]).[12] These 'new' setters up contributed a total of 33,726 muskets, bringing the production of the Pattern 17[redacted] musket by the Ordnance System during the war to 96,287. In addition to this number a further 15,002 complete muskets and bayonets were delivered by the firms of Jordan & Farmer, Jordan, and Farmer, bringing total production to 111,289.[13] Although this represents the main stream of Ordnance production for the period, small arms production was considerably expanded during the war to meet new needs created by Britain's increasing commitment to the Continental war.

The first category of arms to be modernised after the musket was the Land Service pistol. Because of the great rarity of Ordnance-made pistols prior to this period (as compared with those made to regimental patterns), it is difficult to establish with certainty the precise introduction date of the new design, but the earliest dated examples of this new type which have thus far been noted are dated 1738, and this is probably related to the order for 250 pairs of locks and barrels delivered in by Edward Jordan in October of that year. In June 1738, and

again exactly one year later, Hollier delivered sets of furniture for 1000 pairs of Land Service pistols, while John Vaughan had supplied an additional 650 pairs of locks between August, 1736 and February 1739. Barber set up 300 pairs of carbine-bore pistols in February, 1740, and Pickfatt's delivery of the same number occurred in April.[14] Apart from the increase in bore size the new pistols were fitted with double bridle locks and are designed to conform to the stock carving found on the Pattern 1739 muskets around the lock and sideplate flats and the barrel tang; they are also more elaborate in their furniture, with the 'long ear'd buttcaps' giving not only additional strength to the grip, but a more elegant appearance in imitation of current French design. The pommel of the buttcaps was reinforced and made heavier by a raised apron around its central portion, making it a more effective club. The sideplate and trigger guard finials are reduced-scale versions of the design used on the Pattern 1739 musket. The need for pistols, and for the carbines which generally accompanied them, accelerated sharply after Britain's entry into the war against France in 1744, and manufacture of pistols increased sharply over the next two years. Components were delivered in during 1741-2, and Waller rough stocked 1700 pairs of carbine bored pistols and 2500 of pistol bore between June, 1742, and September, 1743. A further 3500 pairs were delivered by July, 1745. These were set up largely by the 'new' contractors from 1744 to 1746. Unfortunately the records do not always specify which bore size is being delivered, and although a total production figure is obtainable, a breakdown by calibre is not. Thus we find that Waller turned in a total of rough stocked pairs of pistols between 1740 and 1748 amounting to 9438, of which 5312 pairs were set up by nine contractors with Pickfatt accounting for 2300 pairs. Hollier delivered in sets of Land Service pistol furniture for 8398 pairs. Of barrels, 930 pairs can be accounted for as carbine bore, a further 8063½ as pistol bore and 1516 with bore unspecififed,

giving a total of 10,509½ pairs of Land Service pistol barrels. The contractor whose name is most likely to be found engraved on the tail of the lockplates for this production period is Edward Jordan, who was responsible for supplying 2807 of the 8715 pairs delivered between 1740 and 1748; Jordan was followed, in order of significance, by Vaughan (1925), Willet (1350), Tipping & Edge (1000, probably signed only 'Edge'), Farmer (866), Smith (600) and Clarke (167). In addition to his supply of locks alone, James Farmer delivered 1000 pairs of Land pistols in late 1747 and early 1748; these will have his 'IF' barrel mark as well as internal lock marking and the external signature. Locks bearing the signature 'Jordan & Farmer' will be part of that partnership's delivery of 1500 pairs of complete Land Service pistols at £1.13.0. the pair, delivered in 1745-6.[15]

Seventeen forty-four was a year of particular interest in the Ordnance's history, for the first of several distinctive new arms was added to the production series. This was the 'Short Land Musket with Wooden Rammer for Dragoons.' Until this time, and presumably for some years to come, dragoons carried conventional muskets, or carbines, a large percentage of them made to regimental designs, some of them at least having barrels of about 42 inches. When, in early 1726, eight regiments of dragoons then stationed in Great Britain needed arms for an augmentation, the Board received instructions to issue 'out of His Majesty's Stores' the required number of arms 'agreeably to the Several Patterns, that shall be exhibited to Them by the respective Collonels of the said Regiments,' a clear indication of the non-standard nature of dragoon carbine and pistol design at this time. However, in 1744 the situation was regularised and a distinct pattern established. They were fitted with double bridle locks, and had 42-inch barrels of musket bore, all other features conforming to the infantry musket which was now termed, to distinguish it from this new arm, the 'Long Land Pattern.' James Farmer delivered the first 750 42-

inch barrels in October, 1743, and a further 2990 during 1747; Waller delivered 1954 rough stocked arms of the new dragoon pattern in June, 1744, on a warrant of January of that year, and a further 3000 in May, 1747. Of this number a total of 6533 were set up between 1744 and 1749, of which only 1619 were delivered during 1744, and no more came in until 1747. This would seem to suggest that the dragoons fought most of the War of the Austrian Succession with their older pattern arms. [16]

Another new arm which first appeared in quantity at this time was a New Pattern carbine. Unfortunately, there are no details in the records as to what was new about the pattern, and no examples of carbines dating from this period have been reported to date. The problem is further compounded by the fact that no carbines dating from the period between 1711 and the 1750s have been reported, so that we do not know what the predecessors of the New Pattern looked like either. From an order for rammers of 1716 we do know that the barrel length of the carbine was 37 inches, a length that was to be retained for cavalry carbines until the variants for light troops began to appear in the late 1750s.[17] Ordnance carbine production was very limited prior to the 1740s; we know that two types, a brass mounted and a New Pattern,(there is no suggestion that iron mounts were used for carbines), were made during the production period of the Pattern 1718 musket, 150 of the brass mounted type and 1046 of the New Pattern being set up prior to 1721. In 1730 Waller had rough stocked 500 carbines, which were set up by Pickfatt in the following year, with 147 carbines being newly rough stocked, repaired and set up in 1732, the latter obviously not representing an entirely new product. Not until 1738 was there any new carbine production; in the course of that year Waller rough stocked 1077 of which 600 were set up by Barber and Pickfatt (half each) in 1739; Hollier sent in 2300 sets of carbine furniture in 1738 and 1739, and then no more until 4727 sets arrived in 1742-4, of which more than half did not appear before August, 1743.

Other components did not begin to arrive in store until December, 1741, and no significant amounts arrived until 1743, suggesting that with the war being as yet almost totally naval in nature, carbines were not a high priority in the build up of the land forces. Since we do not know what the weapon itself looked like,it is difficult to fix upon which of the components may have reflected aspects of the new design; however, it would appear that, after a small initial production of the 'New Pattern' carbine (probably introduced to conform with the modernised design of the pistols with which they were generally issued), the re-equipping of the line infantry took precedence for the next few years. Certainly serious carbine production did not get under way until 1743. Pickfatt delivered 500 carbines in October, 1743 to a warrant of April, 1742, but there were only a further 350 delivered in the course of 1744 by five setters up, of whom Barber and Pickfatt with 100 each were the most important. During 1745 the bulk of the production was carried out, with 3398 carbines being delivered, with an additional 1500 complete arms from Jordan & Farmer, making a total delivery for 1745 of 4898. A further 225 came in during 1746, and Joseph Farmer delivered another 1000 complete carbines late in 1747.It would appear that a planned production of 5000 new carbines, projected in 1738, was achieved by 1746, and that this programme was supplemented by 2500 complete arms from Birmingham, which were first warranted in the Spring of 1745. There was no further carbine production until preparations began for the next contest with France.[18]

On 23 July 1745 Prince Charles Edward, son and heir of 'James III of England and VIII of Scotland' landed on British soil, and on 19 August he raised his standard at Glenfinnan. Although there had been rumblings, and even some overt warnings of such an attempt to re-establish the Stuarts on the British throne the event itself came as a thunderclap to the British Establishment, and the Ordnance was in no way excepted. In 1740 Britain's land forces

consisted of about 9000 cavalry (the Blues, four troops of Horse Guards, four troops of Horse Grenadier Guards, four regiments of Horse and ten regiments of Dragoons) and 21,600 infantry, (three regiments of Guards and thirty line battalions) many of whom had been re-armed during 1740-1.[19] The land war with France had finally evolved from expectation to fact; a British contingent of some 16,000 men (twenty-one battalions) had joined the forces of Hanover as auxiliary troops to the Austrians late in 1742, and these had been new-armed prior to their departure.[20] On 29 March, 1744, the state of war between Great Britain and France became official, by which time the British troops in Flanders amounted to some 22,000 men.[21] In July there was an augmentation of the twenty-one battalions then in Flanders amounting to two companies of three serjeants, three corporals and seventy men each, which meant another outflow of 3066 muskets from the King's Stores, in addition to the constant drain for replacements and smaller individual augmentations.[22] There had been an invasion scare at the end of 1743, but this had not lasted long enough to have any effect on Ordnance activity, and although production of small arms was proceeding smoothly by 1745, the output was not geared to deal with both foreign campaigning and internal rebellion.

There were only 3850 regular army stationed in Scotland at the time of Charles Edwards' landing, and one of the earliest reactions to the crisis by the London government was to commission Lord Loudoun to raise a regiment of loyal Highlanders consisting of 988 men armed 'with the Shortest Musquets of a Carbine Bore with Bayonets.'[23] The Ordnance reaction to this was entirely typical: having no such arms available, it purchased the entire quantity required, 950, for 30/- each complete with bayonet, from James Barber, who delivered them in September, 1745, to a warrant of 28 June.[24] These arms had a very active and varied career, Loudoun's men having lost many of them by shipwreck, and only one example is known to have survived. A 'State' of small arms in

Scotland, Berwick and Carlisle on 1 January 1745, revealed a total of 8782 of which 6646 were in Edinburgh Castle.[25] A further 5000 stand were ordered distributed between the castles at Edinburgh, Stirling and Inverness on 1 August, although it is unlikely that they had reached their destinations by the time Edinburgh fell to the rebels on 17 September.[26] At about the same time another 5000 stand were ordered sent to the troops in Flanders, and a further 2000 stand along with 200 wallpieces to the fortress of Louisburg in Canada.[27] By September it had been discovered that the county militias could not be financed for a long enough period to meet the present crisis, and could neither be raised nor equipped in what was considered the necessary time; this factor, coupled with the fall of Edinburgh and the rebels' defeat of Crown forces at Prestonpans, decided the Government to allow the county nobility and gentry to raise units at their own cost, who would be armed by the Government; in addition, the critical garrison towns in northern England were to be reinforced.[28]

By the end of September arms were being dispatched to the town authorities at Carlisle (300), Newcastle (1000), Hull (3000) and Chester (1000); and the Duke of Kingston's Horse had been sent 400 muskets & bayonets, 200 pairs of pistols and 200 horseman's swords, along with 500 arms for the mayor of Nottingham to distribute. Although thirteen of the regiments which were now being raised, representing some 9500 muskets, would subsequently be disbanded and their arms called in, in June, 1746, for the moment their creation caused a tremendous drain on the Ordnance's resources. The arms distributed from late September, 1745 until February, 1746, in aid of suppressing 'the Forty-five', amounted to some 25,500 muskets, 504 carbines and 716 pairs of pistols.[29] And these arms represented only a part of the demands being made; at the end of November the Board informed the Master General:

> ...we have issued, and have orders to issue very near Forty Seven Thousand Musquetts with Bayonetts out of his Majesty's Stores since the beginning of

> August last, and that at this time no more remain in in Store than Twenty One Thousand four hundred and thirteen.

They also mentioned that the workmen were being paid in ready money rather than by the usual method of debentures in the course of the Office, and that unless they shortly received the 10,000 arms bought lately in Holland, they would be unable to meet a request for 20,000 arms from the Lord Lieutenant of Ireland.[30] It was, altogether, a most impressive effort, given the primitive communications and transportation systems of the time, and the personal nature of both government and finance. Unfortunately we have no way of knowing just what sorts of arms were sent around the country during the emergency; some of them will have come from the seizures of arms in the possession of Catholics in England, while others may have been foreign arms from captured prizes, and still others may have been from amongst the old arms remaining in the King's Stores; it is at least questionable that a majority of those issued to non-regular recipients will have been 'of the King's Pattern.'

The exigencies of war created several types of arms not normally encountered in the Ordnance programme. Apart from a small group of regimental-pattern arms produced by Lewis, and later his son James, Barber, all of these aberrant arms may be classed as special purpose weapons. The regimental arms of the Barbers include 229 muskets and bayonets at 30/- each, for Lord Crawford's regiment, which were delivered as complete arms in May, 1740.[31] Crawford's was the 43rd Foot, shortly to become the 42nd Royal Highland Regiment, the 'Black Watch.' Although none of these arms has yet been identified, it seems reasonable to conclude that they will be of lighter and shorter dimensions than the conventional Pattern 1728 musket of the day, and it is perhaps significant to note that they are described as 'muskets' and not 'carbines,' and may have served at least in some respects as a pattern for the second group of Highland arms supplied by Barber junior to Lord Loudoun's regiment in 1745. The next group of Barber

arms are 84 pairs of pistols delivered as complete arms in August, 1745 for 'late Churchill's' dragoons, presumed to be the 10th Dragoons (Hussars). Barber's final contribution was made between 1746 and early 1748, during which period he delivered 488 carbines for the Duke of Cumberland's Dragoons; of this number 390 were delivered in November and December of 1746, with a further thirty in October, 1747 to replace losses at the battle of Val, and a final sixty-eight in March, 1748.[32] The records suggest that the pattern for this carbine may have been devised by the Ordnance, rather than by Barber, and that the Duke himself may have taken some active part. On 3 March 1746 Thomas Hatcher, who had taken over as Master Furbisher on the death of Richard Wooldridge the previous year, travelled to Kingston-upon-Thames with pattern arms to show to the Duke. Fortunately the design was subsequently adopted for wider use, and continued from the mid-1750s as carbines for the Horse Grenadier Guards or 'Blues'. Its distinguishing features include a flat-surfaced lockplate and cock, a broad flat sideplate, a steel rammer and 'shell' carving around the barrel tang, with better quality wood and finishing throughout.[33]

Turning to the special purpose arms which were produced on the Ordnance system during or shortly before the war, we find that most were made for Sea Service, and that all types remain unidentified at this writing. The earliest of this group were known as 'Musquets with Dutch barrels and locks'. In 1738 Waller had rough stocked 1000 muskets with Dutch barrels and locks, for which Hollier had supplied 1000 sets of furniture, and of which Barber and Pickfatt had each set up 300, but these could not have been related to the arms purchased in 1740-1, and must have derived from the parts in store from earlier purchases. In December, 1746, there were 5881 of these 'Land Musquets with Dutch barrels and Flat locks' in store at the Tower.[34] A second, much larger category was described as 'old muskets returned into store from regiments and garrisons' most of which, if the

interpretation of the figures is correct, do not seem to have been completely finished. Beginning in February, 1742, and continuing until March, 1745, Waller rough stocked 16,718 muskets of this general description, plus a further 4735 specifically on Sea Service account, while from March, 1743, until September, 1746, Hollier supplied 18,963 sets of flat brass furniture for them. Five contractors (Smith, Farmer, Jordan, Vaughan and Willet in descending order of numbers supplied) furnished 8954 'flat plain locks' costing 4/6 each between June, 1744, and September, 1748, of which 5444 were in store by September, 1746. All of these strange and ill-defined arms, were set up by seven contractors between September and December 1746, at a cost of 5/10 each, but the total number set up amounted to only 7000 of those rough stocked by Waller. One additional group of 400 set up by Pickfatt in April, 1744, at the much greater cost of 9/8 each, must have differed in some important characteristic, but like the others it remains unidentified. Although there is no specific reference to their ultimate destination, it is probable that these arms ended up in the hands of the Invalid companies, dockyard battalions and other garrison troops. Given that they were re-stocked and fitted with new furniture, as well as locks in most cases, it would seems that these 'old, returned' muskets were actually new arms using old barrels and some old locks, rather than simply re-worked old arms. None can be identified as being in store in the December, 1746 inventory.

The two remaining categories of special purpose arms produced by the Ordnance are both of late-war vintage. The first of these was a musket specifically designed for the Marines. Thomas Hatcher showed a pattern to the Lords Commissioners of the Admiralty in July, 1747, but Waller did not carry out the rough stocking of 3381 of these arms until the Spring of 1748, and the total of 3380 Marine muskets were not set up by the eight contractors until the period May to December of that year; it is, therefore, most unlikely that any were issued during the War of the

Austrian Succession. The records shows that these muskets had flat locks (perhaps these were the 3000 plain flat locks turned into store between June, 1747, and September, 1748, after the last of the 'old muskets' had been completed), and that the setting up cost 5/10, the same as that for the 'old muskets.' This similarity does suggest that the Marine musket may have been a somewhat better finished version of the 'old muskets', and that at least some of the 'old muskets' may have been issued to some of the Marine regiments. The final type of arm in this series was known as the Extraordinary musket, a term which had been in use late in the 17th and early in the 18th. Centuries for better quality Sea Service muskets. However, these one hundred muskets must have been quite distinctive. if their costs tell us anything. Rough stocked by Waller in March-June, 1747 at a cost of 8/- (the Land Service musket cost 4/2 if Waller used his own walnut or 2/6 with the King's wood), fitted with 'Extraordinary musquet barrels' produced by Edward Jordan in September, 1740, and with locks all delivered by John Smith in March, 1747 at 10/- each (the Land Service musket lock costing 6/6), and with special furniture by Hollier supplied by him in September, 1747, and set up in September, 1748 by Barber and Pickfatt (half each) at a cost of 9/- each (Land Service muskets costing 7/8), these must have been very superior arms in all respects.[35]

The production of Sea Service arms during the war does not accurately reflect the very active nature of the war at sea, largely because so many 'auxiliary' types of arms, as discussed above, seem to have found their way into the Sea Service as a matter of Ordnance policy; it is also likely that many arms captured from French and Spanish ships may have been taken into service without the details surviving in the Ordnance or Admiralty records. Indeed, the entire early development of the Sea Service musket is clouded by a lack of, or vague, descriptions, and by the nature of the Board's policy in supplying the Admiralty with small arms. These had

traditionally been a combination of a small number of new-production arms combined with a large number of re-worked Land Service weapons. A certain degree of revision in this practice took place at the beginning of our period, when it seems to have been the intention to completely re-equip the Sea Service with a standard pattern arm, but presumably for reasons of finance and inertia, plus the naval campaigning against Spain in the late 'teens, this programme was never fully carried out. The Board wrote in early 1719 that '...we shall in a little while be able to furnish the whole Fleet according to the New Regulation or Expedient, particularly as to changing the whole sett of small Armes including Pole Axes...' and that '...the Numbers of Armes are considerably increased & much better (according to the New Regulation) than formerly...'[36] The 'New Regulation' was undoubtedly the pattern of iron mounted Sea Service musket produced at the same period as the Pattern 1718 infantry musket, which has yet to be identified. While it is clear that Sea Service arms as produced by the System conformed to specific patterns, with characteristic stock, furniture and lock, it is equally clear that it was standard Ordnance policy to make use of repaired or re-worked second-hand barrels in making up such arms, a practice continued throughout our period. There were two distinct styles of Sea Service musket, a long and a short barrelled version, but they are rarely distinguished as such in the records; indeed, while the longer one with its 46-inch barrel was undoubtedly the original style, the differences in the lengths to which barrels were cut in order to render them serviceable may have rendered the shorter pattern, with a barrel of just over or under 36 inches, subject to considerable variations, even though all other features were standardised; some were produced with barrels of 40-42 inch length, and it is unclear in which category these were included. Unfortunately there are no examples of Sea Service muskets prior to the 1740s from which any conclusions might be drawn, and too few examples in the

1740-64 period for comparative study. Sometime before the 1740s, perhaps at the time of the 1737-8 production, a 'Black Sea Service musket' (as opposed to the Bright Sea Service musket) was introduced, on which the barrel was left in a roughly draw-filed state and finished with a blue-black colouring, presumably to render it less visible for use during night attacks. These Black Sea Service muskets were always of the shorter barrelled type,and were not fitted for bayonets prior to 1752, while the Bright Sea Service muskets were so fitted.[37] Both Bright and Black Sea Service muskets shared a common form of flat-surfaced 'plain' lock (without either type of bridle), with a flat ring-necked cock, a flat topped hammer and a spear-point terminal to the hammer-spring finial; there was also a common style of heavy brass furniture which was a hold-over from the normal pattern of furniture used until the beginning of our period on Land as well as Sea Service arms. This distinctive Sea Service furniture included a flat brass buttplate with a plain rounded tang, a flat-surfaced wavy outline sideplate taking, until 1756, three sidenails to secure the lock, and a distinctive rounded trigger guard with a bulbous circular-outline front finial; there was no thumbpiece, tailpipe or nose-cap, and the wooden rammer remained standard until the late 1780s. The design of the stock was more robust and simpler, lacking the raised carving on lock and sidepiece flats, and having much less of a handrail effect to the butt. Apart from the batch of Sea Service arms produced during the period of increasing tension prior to the outbreak of war in 1739,(see page 80) Waller rough stocked 5683 Sea Service muskets and 8206 pairs of Sea Service pistols during the war, but only a small proportion of these was set up: Barber produced 1000, and 600 pairs of pistols, Pickfatt 2290 and 1600 pairs of pistols, Richard Wilson delivered in 660 pairs of pistols, Nathaniel Trevey 150 pairs and Edward Sale 100 pairs, for a total production of 3290 muskets and 3110 pairs of pistols. Although Waller had rough stocked 479 musketoons

and Hollier had produced an equal amount of furniture for them in 1737-8, only 336 were set up in 1738 by Barber and Pickett (half each).[38]

Wallpieces, like musketoons, were a weapon of limited use and extended service life. During the war Waller rough stocked 813 at 5/- each; Hollier supplied furniture for 800 as well as steel rammers for 700; Jordan supplied 300 locks at 15/- each and 300 barrels at 29/- each; Jordan & Farmer supplied 100 each of barrels and locks; Barber and Pickfatt each set up 150, and James Farmer and Edward Jordan each supplied 100 complete wallpieces for 88/- each.[39]

Seventeen forty-six was the year in which the rifle made its first appearance in British service. The records do not reveal the source of motivation for the introduction of this innovative arm, but the influence of H.R.H. the Duke of Cumberland, and the experiences of he and his entourage on the Continent suggest that they may have acquired some views on the usefulness of the rifle from its use in the armies of Frederick II of Prussia, who had introduced its use during the present war. Frederick had armed the non-commissioned officers of grenadier regiments with a rifled arm in 1742, and had set up a rifle corps in 1744.[40] The British, however, at first considered the rifle as useful protection for engineers, and their earliest recorded <u>intended</u> use was for the expedition going to the relief of Louisbourg, commanded by General St. Clair in the Spring of 1746. Fifty rifled carbines are mentioned in the stores of the train of artillery which was to accompany the expedition.[41] This expedition was cancelled at the last moment, and was re-directed to the coast of France, where it is possible these rifled carbines may have seen service at L'Orient. The Board wrote to Thomas Armstrong, commander of the artillery train then at Portsmouth waiting to sail:

> 'That they approve your buying One hundred Rounds of Ball for the Rifled Carbines, and desire you will order Mr. Parr to pay for them and for Fifty Small Bags to keep them in, the charge of which they will

allow in your Disbursemts.[42]

The rifles themselves do not appear to have been manufactured by the Ordnance, and were probably purchased by an officer on some regimental account. Whether they were of English or Continental manufacture is unknown, but in view of future Ordnance activity in this area is does seem likely that they were bought on the Continent. A 'State' of small arms in the Tower for December, 1746, shows only ten rifled carbines in store at that time, but by January, 1749, all sixty are in store where they remain until 1754; it may be significant that in 1752-4 they are referred to as being 'of sorts' suggesting that they may not have been all of one pattern.[43] In July, 1747, Admiral Boscowan's request for artillery stores for his expedition to India includes 'Rifled Carbines 50', but the Proportion drawn by the Ordnance in October for the supplies actually issued does not include the rifles.[44]

The preliminaries of peace were exchanged on 30 April 1748, although the final treaty was not signed at Aix-la-Chapelle until 18 October of that year. Peace was in the air and there was no further pressure for arms production on the Ordnance; however, the Ordnance was apparently anxious to ensure a reasonable supply of new arms components for future production while Parliamentary grants were still at a wartime level, and in the course of 1748 Waller delivered in 12,000 rough stocked muskets while other contractors delivered some 16,000 double bridle musket locks and 9000 musket barrels, very few of which were made use of for the next several years. In the course of the year the setters up delivered in all but 24 of the 3380 Marine muskets, as well as 2900 Long Land Pattern muskets of the Pattern 1739 type, and 2955 Short Land Muskets with wood rammers. However, the major new development in Ordnance activity during 1748 resulted from the decision to introduce the steel rammer for all infantry muskets. Hollier's first warrant for steel rammers and retaining springs for the tailpipes was dated 3 February 1748, and at the end of March he delivered

10,000 steel rammers, 13,000 springs and 650 feet of brass for bushing the upper ramrod pipe. Under this same warrant a further 3100 steel rammers already on hand were repaired and made fit for service, and at the end of the year a further 3000 rammers and springs were delivered.[45]

During the wartime years of 1739-48, the Ordnance System created some 115,500 muskets, 5000 carbines, 250 wallpieces and 10,100 pairs of pistols. This quantity was produced by a single firm of rough stockers, ten setters up, one furniture supplier, five suppliers of locks and barrels, and three lockmakers. These numbers were supplemented by 46,000 complete muskets & bayonets from Liege and 15,000 more from four domestic contractors, as well as 3500 carbines, 300 wall pieces and 3500 pairs of pistols.[46]

The Wars of 1739-48 were the first conflicts in which the Ordnance System was subjected to the types of strain which might be expected to occur in keeping Britain's armed forces supplied with small arms, and there had been the additional sudden demands created by the 'Forty-five' which came just at a time of setback for the regular armed forces on the Continent. The structure established during the late 1720s seems to have survived fairly well, although a number of additional contractors were added to it from 1742. Both foreign purchase and the acceptance of complete arms were resorted to as supplements to the regular supplies, but an examination of the performance of the Ordnance for our entire period suggests that perhaps these alternatives were, in fact, an accepted part of the overall operation of the system. At least until 1804 the Board, and presumably the government of the time backing it, were satisfied to operate the system as laid down in the 1720s, and were prepared to accept the occasional necessity for expedients such as foreign purchase and accepting complete arms, rather than attempt to operate a different system which might have been more cumbersome and certainly more expensive, and have lessened the Board's

degree of control over the processes of manufacture, for the very occasional benefits derived from an ability to greatly and suddenly expand the domestic supplies.They knew that there were only a certain number of craftsmen capable of doing the work in the manner required, and that a proportion of these men might well be occupied with commercial work at the time the Board wished to employ them; it would therefore be possible to expand the system only up to the level of additional suitable contractors available at the time required. Any other approach than entering into a free and open competition in the market place for the services of these men was held, by the social and business standards of the time, to be not only impractical, but also unwise. Such a concept, and the system it might have created, belong to the realm of 'long term planning' which was unknown to the men of our period.

* * * * * *

With the signing of the Treaty of Aix-la-Chapelle on 18 October 1748, Europe entered a short period of what was, even then, appreciated as only an armed truce. Britain had emerged from the conflict largely on the debit side of the ledger, although this does not appear to have involved any fault of the Ordnance, who had both produced and made available sufficient numbers of the various patterns of arms required by the several branches of the armed forces. For the next seven years the activities of the Ordnance were concentrated in cleaning, repairing and modernising the arms returned into store by the forces, introducing the steel rammer on all infantry muskets, and regularising the administrative functioning of the Office. There was little new production of arms after the completion of outstanding contracts during 1749, until the deteriorating situation in Britain's North American colonies demanded attention from late 1754.

During 1749 the setters up delivered in a mere 450 Long Land Pattern muskets, along with 1189 Short Land

muskets, as well as 500 pairs of pistols and the balance of 24 Marine muskets. But new production of muskets fitted with steel rammers appears for the first time since 1735, and this time it is not directed solely towards the equipping of the three regiments of Guards. It is interesting to note, however, that amongst the muskets being returned from the troops in Flanders were 1000 Long Land with steel rammers, now in store at the Tower and ready to be cleaned, suggesting that either some of the Guards, or one of the Irish regiments had carried their earlier arms into combat.[47] Thomas Hollier delivered 6200 cast brass nosebands between the end of June and mid-December, 1749, and during the year 2237 Long Land muskets with steel rammers were completed by nine of the setters up; none of these have as yet been identified, so it is not known whether they incorporated any other modifications from the conventional Pattern 1739, apart from the rammer, nosecap, a modified upper rammer pipe and spring in the tailpipe. Hollier also repaired 10,000 'new pattern' bayonets which he delivered in June, 1750, and this appears to indicate the introduction of a modification of the Pattern 1728 bayonet in which the zig-zag slot of the socket was bridged over and the bottom of the socket given a raised collar as a reinforce. A number of bayonets conforming to this description have been examined, and the brazing of the added collar is clearly visible.[47] By June there were enough new production arms in store that the Board ordered no more to be set up.[48]

Three thousand pounds of the Parliamentary grant to the Ordnance for 1749 of £177,147.15.10. was to be spent on cleaning and repairing small arms, and setting up new ones, but as noted above the latter activity was abandoned for the present. Much of 1749 seems to have been spent in collecting, transporting and sorting arms returned from the forces, either from disbanded regiments, or sent in as unserviceable or wanting repair. A programme was set up in which the arms were sorted into different categories depending on the amount and type of work required to

render them serviceable, and detailing who was to carry out the various types of work. Thus there were four categories of arms:

1. Those which needed cleaning only, where the stocks were in sound order, but the barrels wanted fresh smoothing, and the locks and brassworks need fresh polishing. These would be done by the daymen.
2. Those which needed a greater amount of cleaning to render them serviceable. The stocks were scratched and bruised, and needed to be scraped, cleaned and re-stained and oiled; and the barrels having got rusty on the underside, they were to be newly draw-filed and smoothed; and the locks and brasswork were to be newly smoothed and polished, with the end result that this group, when completed, would be in no way inferior to new guns. The piecemen would deal with these.
3. This group required repairing as well as cleaning. The stocks, barrels and locks to be done as with the last group, but will want new parts or repairs to them, new rammers, swivels, to complete them. Also to be done by the piecemen.
4. The last group, whose stocks were broken or so badly damaged, were to be broken up and the parts returned into store to await re-stocking.[49]

The gunmakers would strip the guns, smooth and polish the brasswork, 'take out the names on the Barrels and new smooth the same' [that is, remove the regimental marks and re-polish the surface], fit new ramrods, pins and screws, swivels, as required. and re-assemble the guns. The piecemen working on the barrels were to cut them off to the lengths required, dovetail and braze on new loops and sights as necessary, bore them out perfectly clean, and polish them up perfectly on the outside, and file up the breech, loops and sight so they were completely fit for stocking 'according to the Pattern', supplying their own files, oil,borax and spelter. The men were to have the use

of a forge and coal for the brazing work, 'and the Mill for boring as usual.' The locks were to be repaired by 'regular bred Gun Lock Makers' amongst the Small Gun Office employees.[50] According to the Proofmaster, Thomas Hartwell, the new system of repairing had enabled the workforce to break up 10,491 arms, returning their parts to store, and to completely clean all the serviceable arms then in store (amounting to 117,443), many of them twice, including internal oiling which was rarely done, repaired and cleaned some 2500 returned arms, and cleaned and freshly oiled some 10,500 musket barrels, 17,000 musket locks, 27,000 bayonets, 6900 steel rammers, besides swords and cartridge boxes, saving the Office in the process almost £850 per year.[51]

The new broom which was doing most of the sweeping was Charles Frederick, who had been appointed Surveyor General of the Ordnance on 10 April 1750.[52]Frederick had been Clerk of the Deliveries and Comptroller of the Royal Laboratory since April, 1746, and was to hold his present post as Surveyor General, as well as that of Comptroller, until the political upheavals at the close of Lord North's administration in May, 1782. Frederick was probably the most refined, intelligent and talented man to hold an Ordnance appointment during our period. A protege of the newly appointed Master General, John, second Duke of Montagu, Frederick had matriculated at New College, Oxford, and been admitted to the Middle Temple; he was elected a Fellow of the Royal Society (a distinction he shared with his mentor Montagu) in 1733, and was a member of the Society of Antiquaries from 1731 and its Director from 1736 until 1741. His skills as a draughtsman were well above those of the ordinary dilletante. Although the Office may have been functioning well enough as regards the supply of small arms, it was apparently not up to the exacting standards of the new Surveyor General, whose analytical and tidy mind found a number of serious shortcomings in Office procedures, notably a lack of adequate, efficient record-keeping. His investigations

uncovered 'many unaccountable Irregularities with which the Small Gun Office hath heretofore abounded' and 'that great Iniquity was practised during Mr Wooldridge's Time,' but from the surviving evidence, which is admittedly scant, it would appear that much of this was a different approach to procedures rather than downright dishonesty. Frederick was determined, however, that the Board 'would take some speedy and vigorous Measures as will prevent the like Abuses for the future.'[53] By the following January 'A System and a Proposed Regulation for carrying on the Business for the Future in the Surveyor General's Branch' was submitted by the First Clerk, Jeffreson Miles. There had been 'new Regulations' issued from time to time in previous years, most recently in July, 1745, but it appears that they may not have been too well observed.If in its detail it reflects the omissions of the earlier organization, then virtually all of what has survived in the records from this period and later is probably a result of this re-organization. The new Regulations called for a set of books to be kept specifically for the Surveyor General's office, with a staff of twenty-two clerks to run the system and keep the books. The books included a Register Book, a Ledger, a Warrant Book, and Entry Book of Returned Stores, an Estimate Book, copies of the Board's Minutes in their entirety as well as extracts for immediate use, books for specific references to the Surveyor General in the Board's deliberations and for references to the Engineers and Fortifications, a Report Book, A Letter Book for the Surveyor General's outgoing correspondence, four Proof Books for Powder, Guns, Small Arms and abstracts from these, an Experiments and Inventions Book, a book containing Abstracts of all Contracts, a Tonnage Book and a Price Book. Because it presents almost the only detailed overview of the functioning of the core of the Board's operations to have survived from our period, and because, at least for the duration of Frederick's tenure of office it seems to have been adhered to, the methods by which these several books

were kept is worth examining more closely.

The Register Book was for the recording of all bills brought to the Office. When first presented the bearers were to be told to return in ten days' time when they would either be paid, or told why they were not to be paid. The bills, if accompanied by the correct vouchers, or correctly certified, would then be entered in the Register Book; the responsible clerk would compare the bills with the warrants and receipts for the goods, and would then annotate the Warrant Book with the exact date the Storekeeper acknowledged receipt of these particular stores, and initial this entry.

The bills, after being registered, were to be distributed amongst the clerks 'most at leisure' for processing. The method here was 'strictly to be observed.' Two clerks were to work simultaneously and check each other at every stage, and to initial the bills when they have been checked against the Price Book and the other work completed; they were then to hand the bills to a third clerk who was to check that their work was correct. The third clerk then wrote out the total amount 'in words at length' 'in a large round hand', and then initial the work and pass it to the First Clerk for a further verification; the First Clerk then got the approval of the Surveyor General for the payment or 'allowing' of the bills, which were then returned to the relevant clerk who entered the date of allowance in the Register Book. At this stage the bills were distributed amongst the clerks 'most at leisure' and they entered them 'verbatim' into the Bill Books. Once entered in the Bill Books and again endorsed by the clerk who has completed this procedure, the peripatetic bills are delivered to the First Clerk, who enters the entire transaction in the Ledger 'conformable to the present Method', endorses the bills on the back and places them in a press in his Closet to await their collection by the 'Proprietors or Agents of such Bills whenever they shall think fit to call for them.' These proprietors were required to sign the Ledger with

the date on which they took away their bills.

A list of all the Quarterly Bills, which included most of the salaried people in the Office, was to be entered quarterly in the Report Book kept in the Surveyor General's office.

The Ledger, Bill Books and Register Book were to be examined and compared monthly to conform that all of the bills allowed during the previous month have been correctly entered, and endorsed by the examining clerks.

The Warrant Book was to contain detailed information on every warrant for stores or repair work issued by the Office, recorded in eight columns containing (1) the date of the warrant, (2) name of the grantee and type of stores, (3) total amount of the stores, four spare columns for entering dates and details of progress in supplying the stores, and (8) the column to be used by the clerk of the Register Book for noting the date acknowledged by the Storekeeper for receipt of the stores on this warrant. This book was to be verified and endorsed quarterly by the relevant clerks of the Surveyor's, Storekeeper's and Clerk of the Ordnance's offices.

The Entry Book of Returned Stores was to contain the information taken from the bills of lading for such stores, including the date of the bills, the name of the ship and master and place from which the stores come, the total amount, and a survey sorting the stores into Serviceable, Repairable, and Unserviceable. This book was also to be verified and endorsed quarterly by the same clerks as dealt with the Warrant Book.

An Estimate Book was to keep account of the annual Parliamentary Grants to the Board of Ordnance, with credit and debit columns for the ways in which this money had been paid out, in detail.

After every Board meeting (usually twice a week during our period) a fair copy of the entire Minutes was to be taken from the original in the Clerk of the Ordnance's Office, for the particular use of the Surveyor General. Every six months these were to be indexed. A set

of Abstracts of such items as related directly to the business of the Surveyor General's office was to be made after each Board meeting, along with two other books containing all references in the Minutes to the Surveyor General, Engineers and Fortifications branches. These were to record the particulars of the references and the date on which the Surveyor General dealt with them.

The Report Book was to record all reports, answers to references, or Propositions and Regulations of the Surveyor General or his First Clerk to the Board.

The Letter Book recorded all correspondence dealing with Office business from the Surveyor General or his Frist Clerk by his order.

Separate Proof Books for Powder, Guns and Small Arms were to be entered the day following the relevant proof.

A Book of Experiments was to record all such experiments performed in the presence of the Surveyor General or to his order, as well as all new inventions and their supposed merit, to prevent impositions on the Board by subsequent claimants. All refractions of salt petre received from the East India Company were likewise to be set down in this book.

An Abstract of Contracts Book recorded the relevant details of all contracts made with the Board including the name of the contractor, date of contract, date of commencement of the contract and its term of years, annual sums to be allowed, type of goods or services to be performed, and date of expiry.

A Tonnage Book was to be kept for the recording of all such duties on every type of stores, to be approved by the Surveyor General.

The Price Book, recording the prices agreed for all manner of stores, which acted as a guide for the agreeing of any future contracts for a particular type of stores, was to be kept up to date, but no additions or alterations were to be made without the 'Approbation and Sign manual of the Surveyor General.' [54]

While a number of the more general series, such as

the Warrant Books, Minutes and Abstracts of Minutes, survive today, historians have suffered a major loss by the absence of such informative volumes as the Abstract of Contracts, Letter Books, Experiments & Inventions, Register, Small Arms Proof, and Entry Book of Returned Stores which are no longer within the Public Records.

The surviving documents, all heavily endorsed, do suggest that the administrative system described above was implemented over an extended period, and that the network of cross-checking seems to have achieved the goals envisaged by Frederick; but of course it is impossible to judge from the nature of the surviving evidence just how closely the spirit, rather than the letter, of the guidelines were followed. Fortunately, as regards the production and supply of small arms, this degree of effectiveness does not appear to be relevant: delays encountered at various periods are generally attributable to external, rather than internal, factors.

. . At about this time a new service was inaugurated by the Ordnance which tended towards increasing its own control over supply, and offered a service initially to the gunmakers who worked as contractors for the Ordnance, but subsequently to the gun trade both in and out of London. This came to be known as 'Tower private proof,' and was simply a new provision allowing the private gunmaker to send his barrels to the King's Proof House on Tower Wharf and have them tested with the King's Proof, and so marked. Since the barrels so proved were not intended to become Crown property, a variant mark consisting of the Proof Mark only, the crown over crossed sceptres, being struck twice on the breech of the barrel, was used. A commencement date of 1751 for this service seems logical, since it is unlikely to have been introduced during the busy wartime years, and since an objection to it was lodged by the Gunmakers Company, who were never slow in complaining when their prerogatives were threatened, in October of that year. The Tower proof was cheaper than the Company's, and they complained of

loss of trade and undercutting by the Government, but a counter-petition by the gunmakers using the service claimed that the Company's rates for those who were not members of the Company were extravagantly high, and were in restraint of trade since this meant that they could only make lower priced guns if they omitted to have the barrels proved at all, which put the entire business into the hands of only three or four members of the Company. The Board approved the continuance of the private proof, and it appears to have continued into the early Nineteenth Century.[55]

Seventeen fifty saw the introduction of another in the increasing line of 'special service' carbines, this one for officers of the Royal Artillery. Although there is one reference in 1738 to the supplying of bayonets for the fusils of artillery officers stationed on Minorca [56] it was not until 1750 that steps were taken to standardize the pattern and expand the issue. On 15 May forty-seven carbines are reported as having been repaired (i.e. modified from cavalry carbines) and fitted with bayonets for the Artillery, and by the end of the month of the eighty-four reported finished, seventy-nine are to be engraved and issued. These may have been intended for the rank and file, for on the same day the Surveyor General was desired to fix on a pattern of carbine and bayonet for officers of the Royal Artillery, 'the Board intending to provide them for such of the Officers as shall Indent to keep them in good order and return them when called for.'[57] On 22 June the Master Furbisher Thomas Hatcher received the Surveyor General's orders to make up carbines sufficient to equip the officers of five companies of artillery, and requested parts; he ultimately received sufficient for thirty-eight carbines.[58] In July a buff-leather cartridge box with white-metal buckles was sealed, and an order given for a like number as for the 'Fuzees lately given to the Officers of Artillery,'although it was not until March, 1751 that Hatcher was ordered to have a pattern made up and submitted.[59]In August, 1750, Hatcher

reported turning into store thirty-nine carbines with bayonets and buff-leather slings for officers of artillery, at a cost of £1.8.11¼ each.[60] In October, 1751, Hatcher made a fuzee with a carbine barrel and bayonet to the order of the Lieutenant General of the Ordnance at a cost of £1.8.3½ in materials, but it is not clear whether this was a personal weapon or an intended pattern; the former seems more likely since it was the Surveyor General for whom patterns were normally produced.[61]At the end of 1751 the non-standard nature of these artillery carbines was emphasized when a warrant for seven of them was requested so that Hatcher could fit them up, and in reply to a query whether it was necessary to keep a supply of these carbines, the reply was in the negative.[62] The earliest carbines for the rank and file apparently lacked a nose-cap, as it was noted in May, 1752, that the stocks of those belonging to Captain Chalmer's Company 'want capping with brass to make them uniform.'[63] By December of the same year the earlier decision about a supply of artillery carbines had apparently been reversed, and it was reported that 'a sufficient number' of carbines altered and fitted with bayonets for the artillery were now in store.[64] Having got the stores up to the required numbers, in March, 1753, it was announced that in future Bombardiers of artillery would carry carbines and bayonets in lieu of halberds.[65] Early in 1755, four companies of artillery were to be raised for the service of the East India Company, and were ordered to be outfitted with 600 carbines with bayonets, and these had to be altered and the bayonets fitted. By the middle of the year after a survey had been carried out on the carbines of the artillery it was decided that they were in bad condition because they were too lightly stocked at the hand and the fore-end, and further weakened by altering for bayonets, 'being originally made for horse', and also lacked company markings and numbers. One hundred and thirty-nine new ones were ordered made to complete the numbers, indicating the first appearance of a purpose-built Artillery Carbine.[66]By

December Thomas Hartwell, the Modeller, had produced a stronger pattern of carbine for the artillery, and in July, 1756, it was ordered that such carbines be completed to a total of 630 exclusive of cadet's.[67] The origins and production of carbines for the artillery cadets at the Woolwich Academy (founded in 1741) are shrouded in vagueness; largely due to the fact that until the time of the Seven Years War they appear to have been made in tiny numbers by the Small Gun Office workforce, and no specific details were set down in records which have survived. It may even be that none were actually produced until the war years, except that the mention of 'exclusive of cadet's' in the order of July, 1756, does suggest earlier, distinct, production.

Peacetime conditions brought progress in another neglected area, that of the Sea Service. By an Order in Council of 26 March 1746 all muskets for ship's companies were to have bayonets, and be fitted with sling swivels, but given other priorities, little had been done towards implementing the order by the end of the war; is is true that in September, 1749, 1000 Sea Service muskets were ordered to be cleaned, repaired and bayonetted, according to a pattern approved by the Surveyor General, but that was the only indication of activity in this sphere until early in 1752, when the Admiralty made enquiries as to why nothing appeared to have been done. The Board thought that the 1746 Order must have been in error, since previously all ships had been supplied partly with muskets having bayonets and bright barrels, and partly with black barrelled muskets without bayonets, and they wrote to the Admiralty to ask if a mistake had not been made, and noting that it would be very expensive to make the change.[68] Not so, replied their Lordships, the Order in Council had been based upon a consultation with most of the flag officers of the fleet and the Commissioners of the Navy, who had specifically requested that in future all muskets supplied should have bayonets, and hoped that this would be the case.[69] Accepting defeat, the Board

ordered, on 8 May, that all future Sea Service muskets should have bayonets, and on 30 June the Master Furbisher attended the Board and displayed a pattern Black Sea Service musket 'Bayonetted pursuant to the Surveyor General's directions'; a letter was to be written to the Lords of the Admiralty informing them that in future half a ship's allowance of muskets would be of this new type, 'until the whole Complement can be furnish'd therewith.'[70] This suggests that ultimately the Black Sea Service musket with its bayonet was to entirely replace the Bright musket, but subsequent production clearly refutes this. The daymen were set to work altering Black Sea Service muskets for bayonets and swivels. Later in the year it was reported to the Board that there were upwards of 2000 'Dutch and Trade Musquet Barrels' in store which 'have never been proved with the King's Proof', and which if proved, might then make up into 'very good Marine and Sea Service Musquet Barrels.' They were ordered proved.[71]

The Admiralty now advised the Board that the Admiralty's Establishment of 1743 called for only twenty out of one hundred ship's muskets to be of the black barrelled type, and asked that this proportion might be confirmed, to which the Board agreed.[72] By early 1754 the first of the new Black Sea Service arms were being sent to the Out Ports, with Chatham and Sheerness each receiving 500 stand; it was then noted that most of the bayonets applied to both Black and Bright arms had flat blades for which there were no scabbards, and these had to be ordered.[73] The use of old arms and old barrels continued to be a feature of Sea Service production. During 1755, when the maritime aspects of the next conflict with France began to emerge as North America and India came into focus as potential major battlegrounds, repair work on complete arms and the repair and re-proving of barrels for Sea Service increased. There were 1400 muskets & bayonets in store at Portsmouth made for the Marines 'in the late War' which 'had been ordered not to be issued for that Service' and which might now be issued as Bright Sea Service arms,

with the word 'Marine' carefully omitted; this was approved, as was the re-proving and repairing of 602 Long and 268 Short rough-stocked muskets made up with old, thin, barrels with large vents, which were to be converted and set up for Sea Service; another 5000 old barrels in the Tower were to be repaired and re-proved on the same account.[74] In October a State of the arms in store at the Tower showed that 1592 Marine muskets, 3500 Bright Sea Service muskets, 500 musketoons and 1325 pairs of pistols were required to bring the Sea Service stores up to the official requirement; by January, 1756, returns showed that, exclusive of those at the Out Ports, there were 3613 Sea Service muskets in the Tower with 5130 due on warrants, and 15,548 repairable arms in store, they were over the requirement of the 10,000 arms thought necessary to be kept in store.[75] By dint of a large repair programme carried out on second-hand arms, along with a limited amount of new production, the Sea Service branch was held to be in satisfactory condition to face the coming conflict.

Re-equipment of the infantry with the steel ramrod was proceeding apace, although it appears that at least some, and perhaps most, of this work was being carried out by regimental armourers as well as by the Small Gun Office workforce. In January, 1752, Sir Robert Manners, Colonel of the 36th Foot then at Gibraltar, informed the Board that his regiment already had 'iron rammers' and that he declined to accept the 275 new muskets with wooden rammers which had been issued to him from the Gibraltar stores. The Board ordered that he be sent muskets with iron rammers;[76] at the same time the Secretary at War, Henry Fox, informed the Secretary of State Lord Holdernesse that iron rammers were wanted in lieu of wooden ones for other regiments then serving as garrisons at Gibraltar and Minorca, including the 1st and 3rd battalions of the 1st Guards, the 1st battalions of the Coldstream Guards and the 3rd Guards, Col. Herbert's and the Earl of Ancram's regiments, a total of 3347 new rods. The Board ordered

that these rods be issued, along with 2000 springs for the tailpipes and ninety feet of cast brass for filling up (sleeving) the forepipes, and that they be fitted by the Established Armourers at those places.[77]

On 30 June 1752, on orders from H.R.H. the Duke of Cumberland, the official size of the ball for muskets was altered from 14 to the lb. to 14½ to the lb., and all musket ball in store was ordered to be re-cast to the new slightly smaller size.[78] By decreasing the size of the ball and thereby increasing windage betwen the ball and the bore of the barrel, some accuracy was lost, but increased facility in loading a powder-fouled barrel was gained, a vital point in effective rapid volley firing.

Although officially at peace with France, the encroachments of the French government in Canada into lands considered by London as belonging to George II did not cease with the treaty of 1748, and by 1752 their intentions became more overt and tension mounted as the colonial forces of both countries and their Indian allies confronted each other in an increasingly hostile atmosphere. The Five Nations (Six since the 1720s) of the Iroquois Confederacy had been enemies of the French since being attacked by Champlain in 1609, but had managed to establish a form of neutrality in 1701, acting as a balance to the territorial and political pretensions of both the French and the English, occupying as they did key territory in the western part of the province of New York, and with suzerainty over a much wider area extending westwards and southwards.[79] Beginning in 1680s the London government had sought to maintain this Iroquois neutrality a policy of periodic meetings to air mutual grievances between the English colonists and the Indians, and the giving of presents to the tribes; from 1694 these presents had included firearms and ammunition furnished by the Board of Ordnance. The first gift authorized in January, 1694, included '200 Light Fuzees for presents to the Indians who will not carry heavy arms' at 12/6 each,[80] but by the time of the second gift in 1700, the amount had

been increased to 400, at which it was to remain until the final Ordnance-made gift of 1753. Until the present of 1716 these guns had been supplied complete by the gunmakers, but in line with the new Ordnance System from that time they were set up by several gunmakers from barrels, locks and brasswork supplied to the Ordnance by their components contractors. The guns are described as 'Fuzees 3'10" long [in the barrel], Beach stocks stained and varnished [or painted and spotted according to pattern] brass heel & side plates & thumbplates, round locks engraved with King's cypher and brass swage pipes'. They are further described as having 'East India' or 'Carolina' bore size barrels, which from surviving examples of a slightly later period is believed to have been about .58" calibre, taking a ball of 28 to the lb.[81] Presents of this nature, accompanied from at least 1708 by powder, lead and flints, are recorded in 1694, 1700, 1708, 1709, 1716, 1743, and 1753.[82] Although none of these arms has been identified to date, the presence of the Royal Cypher on the lock and possibly the buttplate tang, thumb piece or sideplate, should serve to distinguish them from the contemporary fowling piece, along with the small size of the bore. The parts order for the last Ordnance-made group in 1753 includes '20 Best Northwest 4 foot 0 in Barrels'[83] for the twenty higher grade guns in the order of 400, the earliest recorded reference to a term which was, by the turn of the century, to become synonymous with the term trade gun as intended for North American Indians. The 'Northwest Gun' was to remain in commercial production into the Twentieth Century. Despite the fact that, in 1754, Thomas Hartwell was paid to make an example of each of the two types of gun sent to the New York Indians the previous year, as patterns for future use, this was the last gift of guns to the Indians supplied by the Ordnance until 1813, ~~which will be dealt with in its proper place.~~ No reasons for the failure to continue the long-established practice are given, but perhaps it was found to be much cheaper to obtain them directly from the

private trade, where patterns acceptable to the Indians had long been sold for around 10/-. Whatever the reasons, by 1756 the guns were being supplied by the firm of Richard Wilson and Company of the Minories, who established a monopoly of supply to the Board of Trade lasting into the 1790s.[84]

As well as the Indians, the Board had, intermittently, supplied arms to the governments of several of the North American colonies, usually at times of invasion threats from French Canada, but also to counter serious Indian outbreaks on the frontiers. However, most of the colonial governments lacked the necessary political cohesion and sufficiently strong connections with the British government to obtain either sufficient numbers or an adequate quality of arms from the central government, and most of their arms purchases were from the private guntrade. In most instances the arms sent to the colonies, which were purchased 'at a price' appear to have been of out-dated patterns and of mediocre to poor quality. Issues of arms by the Ordnance to the colonies before the Seven Years War were concentrated in the period of the War of the Spanish Succession, and only occasional between 1715 and 1754; these include 1000 muskets, 12 blunderbusses, 12 'harquebusses' [wall pieces] and 300 pairs of pistols to South Carolina in 1720,[85]300 Land Service muskets with bayonets, slings and cartridge boxes to New Hampshire in 1723,[86] and another 300 muskets & bayonets to South Carolina in 1730.[87]With the threat of an invasion from the Spanish Caribbean in 1739, 1000 muskets & bayonets were sent to South Carolina and Georgia in September, 1739, and another 1000 to New York in November, as well as a total of 2450 to the various threatened Caribbean islands and 300 to Newfoundland to protect the fishermen in 1739-40.[88] New York's four Independent Companies lost their arms through an arsonist's fire at Fort George in 1740, and two years later these 384 muskets & bayonets were replaced.[89]In 1744 Newfoundland received shipment of 500 Dutch muskets sent

to the garrisons at Carboniere, Terryland and Trinity Harbour, and a year later the newly raised South Carolina Independent Companies received 312 muskets & bayonets.[90]The arms of the American colonial troops who captured Louisbourg in June, 1745, were described as 'what was bought for the Coast of Guinea Trade, and most of them are very bad' so replacement arms for two battalions of 1000 men each were shipped over in August, 1745, along with 200 wall pieces.[91] The settlers who were to replace the French inhabitants of Nova Scotia and found the town of Halifax were given 1000 muskets with long Spanish bayonets to protect their settlements in 1749, and these appear to have been a mixed bag of old and captured arms in the Tower stores.[92]During August, 1753, Maryland was authorized to receive 300 muskets with single bridle locks, and New Jersey 1500 muskets and bayonets.[93] These arms were intended for the colonial militia and were sent at the request of the respective colonial governments. New Jersey had not received her allotment by early 1755, and privately purchased 500 muskets & bayonets from the Wilson firm in London to equip her 'Blues' regiment.[94]

During this seven year period of armed truce, a number of changes in personnel amongst the various contractors took place, which caused a shift not only in names during the coming upsurge in production, but in responsibilities as well. John Vaughan, the Birmingham lockmaker active since the reign of Queen Anne, died early in 1748, and his last orders were delivered late in 1747.[95] Thomas Hollier, another key figure in the system, died in the spring of 1754, and in May his lease of the Armoury Mills at Lewisham was taken over for thirty-one years by Richard Hornbuckle;[95] however, for most of this time Hornbuckle seems to have concentrated on the refurbishing of edged and pole arms, and the supplying of gun furniture, bayonets and small work was parcelled out to separate contractors. The first of these to appear in the records were the uncle and nephew partnership of William and Edward Loxham, who became sword-cutlers to the

Office and took over the supply of swords and bayonets, having a virtual monopoly in the latter area until the middle of the American War. At the same time, in July, 1754, William Sharp, brother of Richard who had acted as engraver to the Office since at least 1743, now offered to supply forged nails and triggers, pinning wire, swivels, steel rammers, steel springs and Sea Service pistol ribs (i.e. smallwork) and this was accepted. Later in the following year Sharpe described his situation as that of a Pieceman in the Small Gun Office, who, as had his brother, always worked in the Storehouses, the same as other piecemen; he asked that this 'indulgence' be confirmed, and granted to four other men, presumably his employees.[96] In September the partnership of Joseph Hartwell and Thomas Mayor contracted to supply brasswork to the Office, replacing Jonathan Buttall who had recently died; although a brass founder in his own right, Buttall does not otherwise appear in the records and is assumed to have supplied Thomas Hollier as a sub-contractor.[97] In February, 1755, Richard Waller requested permission to take his son James into partnership as a contractor for rough stocking, to which the Board agreed. This partnership was to function until Richard's death in February, 1769, when Joseph Loder was admitted as a second rough stocker, along with James Waller.[98]

When Virginia Lieutenant-Governor Dinwiddie's report of January, 1754, on George Washington's visit to the French forts in the upper Ohio Valley during 1753, was digested in London, it became clear to the Pelham Ministry that French intentions of claiming and holding this vast area were being actively pursued to the detriment not only of English claims, but the English fur and Indian trades as well. Although peace continued to be the official policy of both sides, yet each was determined to halt the progress of the other in the trans-Appalachian region. After the failure of Washington's expedition against the French fort-building operation at the forks of the Ohio River, and the failure of the Albany Congress to reach

agreement over united colonial action and control of the Indian trade, London countered by establishing a Northern and Southern Superintendancy of Indian Affairs, a single Commander in Chief for North American forces, and determined to send a force of regular British troops to strengthen the colonial militia and enforce British claims. A request was received as early as June, 1754, from the Governor of North Carolina, Arthur Dobbs, for 1000 'assorted, non-King's Pattern' muskets for his colonial forces, and he was sent Dutch muskets from the 1741 purchase, fitted with flat bladed bayonets.[99] In October the Board received instructions to prepare complete sets of arms for two regiments, Halkett's (44th) and Dunbar's (48th) of 700 men each, and for two other regiments of 1000 each which would be raised in North America. The first two, the so-called 'Irish regiments' were supplied with King's Pattern muskets having steel rammers but without nose-caps.[100] The two other regiments, which were to become the first and second battalions of the Royal American Regiment (62nd, re-numbered 60th) were issued with two types of musket: the first battalion received 1000 with single-bridle locks, wood rammers and nosebands, while the second received Dutch muskets, also with nosebands and wooden rammers.[101]

The commander of the North American expedition and the new Commander-in-Chief in North America was Major-General Edward Braddock, an old campaigner, lieutenant-colonel of the Coldstream Guards and currently Colonel of the 14th Foot, and the choice of H.R.H. the Duke of Cumberland who was also effective commander-in-chief of Britain's land forces.[102] Cumberland was anxious that Braddock receive every assistance in the execution of the coming operations:the Duke's secretary, Colonel Napier, wrote to the Board that the Quartermaster General of the expedition wanted 'a Dozen of Rifled Barrel Carbines' and received the Duke's orders to apply to the Board for them, and that the 'H.R.H. thought it would be of Service to send three Suits of Armour for the Engineers who in that

Woody Country may be obliged to reconoitre within Musquet Shot.' The Board responded with an order 'that 12 Rifled Barrel Guns with their proper Moulds, 4 Barrels of Powder, ½ cwt of Lead and Six Dozen of Signal Rockets with their Sticks and 3 Suits of Backs, Breasts and Headpieces be sent and added to the Proportion.'[103] The rifles referred to were part of the sixty which had been in store since the end of the last war; this is confirmed by a Return of Arms in the Tower dated 31 December 1754, which records only forty-seven rifles then remaining.[104] The engineers, who were intended to carry the rifles, being at the very head of the vanguard of Braddock's force when the surprise confrontation took place in the ravine near Turtle Creek on 9 July 1755, (most certainly reconnoitring within musket shot!), it is highly unlikely that either their rifles or armour escaped falling into the hands of the enemy, since the Indians would have considered these as prize items amongst the immense booty they took.

The period from 1739 to 1754 witnessed the Ordnance System under its first period of full-blown operation under the stresses which it was designed to meet. Unfortunately the surviving documents do not tell us whether the Board felt that the System lived up to expectations, and there are a number of occurrences which might create some uncertainty in drawing a positive conclusion. Amongst these are the early purchases of arms in Liège, the delays in component supplies because of the severe winter weather in 1739-40, (which two items may well have been linked), the taking on of seven new setters up in 1742-4, and the outright purchase of specialist arms such as the carbines for the Duke of Cumberland's Dragoons and Loudoun's Regiment. However, my overall impression is that each of these factors was within the Board's overall outlook, and that none of them were in fact panic reactions to unexpected events. The harshness of winter weather was a factor which would have been well known, and from which delays might be expected in the normal course of events. The purchase of Liège arms was almost certainly

done with the predictable demands from Ireland at the beginning of a war, and the planned raising of ten new regiments of marines, in mind. The new regiments were seen as an economy measure and as a way of avoiding an increase in the established standing army - always a bone of political contention. The adding of new setters up to the manufacturing network was done without disrupting the fundamental suppliers or the existing setters up, in such a way that they merely took up components which were not being used and produced complete arms from them, augmenting and not competing with the older firms. This was, in fact, very probably the way in which the System was intended to work when expansion was called for under wartime pressure. The purchase of specialist arms (from a long-established contractor to the Board) avoided an injection of new patterns and negotiations into the normal manufacturing sequence, and achieved the desired effect with no disruption of that sequence.

If the interpretation of the above circumstances is correct, then the Ordnance System can be seen to have worked admirably during the period of increased demand created by the wars of 1739-48. Basic components were supplied in sufficient numbers to fully employ an expanded network of setters up, and the demands of the various branches of the service were met, so far as the records tell us, without complaint. One exception to this latter point must be mentioned. The marines were not pleased with the 'Dutch muskets' from Liege with which they were issued, but the evidence clearly shows that this was a matter of regimental pride being hurt, rather than inadequate weapons being issued to them. They felt that they should have had weapons fully up to army quality, and did not want to accept weapons of inferior finish. The issue did get over the timing problem for the Board, and the marines were re-equipped with King's Pattern arms in the course of the war.[105] With the smooth transition from expanded wartime production to peacetime refurbishment and conversion, the Board were justified in concluding that their arrangements for small arms production were satisfactory.

Footnotes to Chapter 3.

1. SP 41/36, 'State of Land Musquets according to the King's Pattern, 1 January 1738/9.

2. Ibid., 13 Oct. 1743.

3. Ibid., 18 Mar. 1740, Remain and Issues.

4. Ibid., 28 May 1740.

5. Ibid., 13 Oct. 1743.

6. Ibid., 12 June 1740.

7. WO 55/1795, folder 808, letters from Robert Trevor to Edward Short at Tower,1741-2, 25 May 1742; WO 55/350, 9 Oct. 1740, 30 July 1741; WO 55/342B, 14 Oct. 1745.

8. WO 48/81-2, passim.

9. Ibid.

10. Description based upon personal examination of examples in the collections of the Royal Armouries, H.M. Tower of London, the Museum of Scottish Antiquities (Edinburgh), and Colonial Williamsburg.

11. WO 48/82-89, passim.

12. Ibid.

13. Ibid.

14. Ibid.

15. Ibid.

16. SP 41/6, Part 1, 9 Mar. 1726; WO 48/82-89, passim.

17. WO 47/29, 1 May 1716, 99.

18. WO 48/82-89, passim.

19. F.H. Skrine, Fontenoy (London,1906), 62; WO 55/351, passim.

20. WO 55/351, passim.

21. Skrine, op. cit., 94,97.

22. WO 55/352A, passim.

23. Ibid., 20 June 1745; W.A. Speck, The Butcher (Oxford, 1981), 29-30.

24. WO 48/86

25. SP 41/37, 6 Aug. 1745.

26. WO 55/352A, 1 Aug. 1745.

27. WO 55/352B, 20 Aug. 1745.

28. Speck, op. cit., 38, 70-71.

29. WO 55/352B, passim.

30. SP 41/37, 23 Nov. 1745.

31. WO 48/81.

32. WO 48/86-88; WO 55/353.

33. WO 48/88, 3 Mar. 1746; SP 41/21, 28 June 1755; WO 47/46, 4 July 1755, 18.

34. WO 48/83-87, passim.; SP 41/37, 13 Dec. 1746.

35. WO 48/88-9; SP 41/37, 13 Dec. 1746.

36. ADM 1/4006, 3 Feb. 1719, 30; 3 Apr. 1719, 53.

37. ADM 1/4010, 7 Apr. 1752.

38. WO 48/81-8, passim.

39. Ibid.

40. Wirtgen, op. cit., 111, 117.

41. WO 55/352B, 7 May 1746; SP 44/186, 10 May 1746, 310.

42. WO 55/1813, 3 June 1746.

43. SP 41/37, 13 Dec. 1746, 1 Jan. 1749; WO 47/37, 8 Jan. 1751, 17; SP 41/38, 1 Jan. 1752; WO 47/41, 9 Jan. 1753, 27; WO 47/43, 24 Jan. 1754, 35.

44. WO 55/353, 25 July, 14 Oct. 1747.

45. WO 48/88-90, passim.

46. WO 48/80-90, passim.

47. WO 47/34. 11 Apr. 1749.

48. WO 48/90-1, passim.

49. WO 47/37, 19 Feb. 1751, 190-1.

50. WO 47/34, 20 June 1749, 496-7, 4 June 1751, 553-4.

51. WO 47/38, 7 Oct. 1751, 224-7.

52. WO 47/35, 10 Apr. 1750.

53. WO 55/1816, 25 June 1750.

54. Ibid., 14 Jan. 1751.

55. WO 47/38, 8 Oct. 1751, 222-4; WO 47/42, 17 July 1753, 40.

56. WO 55/350, 16 May 1738.

57. WO 47/35, 15 May 1750, 386, 29 May 1750, 437.

58. Ibid., 22 June 1750, 514.

59. WO 47/36, 20 July 1750, 17; WO 47/37, 12 Mar. 1751, 263.

60. WO 47/36, 28 Aug. 1750, 131.

61. WO 47/38, 12 Oct. 1751, 235.

62. Ibid., 3 Dec. 1751, 415.

63. WO 47/39, 8 May 1752, 397.

64. WO 47/40, 15 Dec 1752, 305.

65. WO 47/41, 8 Mar. 1753, 226.

66. WO 47/45, 25 Jan. 1755, 51, 30 Jan. 1755, 73, 6 Mar. 1755, 173; WO 47/46, 22 July 1755, 76.

67. WO 47/46, 23 Dec. 1755, 560; WO 47/48, July,1756, 5.

68. WO 47/39, 28 Mar. 1752, 306; ADM 1/4010, 7 Apr. 1752, 170.

69. WO 47/39, 4 May 1752, 391.

70. Ibid., 8 May 1752, 397, 30 June 1752, 517.

71. WO 47/40, 21 Nov. 1752, 233.

72. Ibid., 21 Nov. 1752, 240.

73. WO 47/43, 14 Mar. 1754, 169.

74. WO 47/46, 10 July 1755, 39, 19 Aug. 1755, 168, 15 Nov. 1755, 437.

75. WO 47/46, 22 Oct. 1755, 348; WO 47/47, Jan. 1756, 38.

76. WO 47/39, 17 Jan. 1752, 55.

77. Ibid., 10 Apr. 1752, 331; SP 41/20, 28 Jan. 1752.

78. WO 47/39, 30 June 1752, 514.

79. Richard Acquila, The Iroquois Restoration: Iroquois Diplomacy on the Colonial Frontier 1701-1754 (Detroit, 1983).

80. WO 55/340, 6 Jan. 1694, 103.

81. WO 50/17 (1709); WO 48/39 (1700).

82. WO 55/340, (1694), 103; WO 48/39 (1700); WO 47/25, (1708); WO 50/17 (1709); WO 47/29, 87, WO 55/346 (1716); WO 55/351 (1743), 250; WO 47/42 (1753), 110.

83. WO 51/193, 29 Nov. 1753.

84. Research on the Wilson supply is based on the PRO, Colonial Office and Treasury Papers, and is to be the subject of a separate publication.

85. Public Record Office, Colonial Office 5/358, Sept 1720, 38. Hereafter cited as CO 5/358.

86. WO 55/347, Oct. 1723.

87. WO 55/349, 21 July 1730.

88. WO 55/350, passim.

89. WO 55/351, 30 June 1742.

90. WO 55/352A, 19 July 1744, 24 July 1745.

91. WO 55/352B, 8 and 23 Aug. 1745.

92. WO 55/353, 15 Apr. 1749.

93. WO 55/354, 9, 10 Aug. 1753.

94. CO 5/1032, New Jersey Assembly Proceedings 1752-1760, 17 Mar. 1757, 24 Aug. 1757, 13 Oct. 1757, 24 Mar. 1760.

95. WO 47/43, 7 May 1754, 262.

96. WO 48/84, 1 Nov. 1743; WO 47/44, 18 July 1743, 35; 24 July 1754, 57; WO 47/46, 19 Aug. 1755, 170.

97. WO 47/44. 27 Sept 1754, 144.

98. WO 47/45, 3 Feb. 1755, 84; WO 47/73, 10 Mar. 1769, 125.

99. WO 47/43, 25 June 1754.

100. WO 47/44, 11 Oct. 1754, 187.

101. WO 55/355, Oct. 1754.

102. The best account of the 1755 campaign is: Paul E. Kopperman, Braddock at the Monongahela (Pittsburgh, 1977).

103. WO 47/44, 5 Nov. 1754, 242.

104. WO 47/45, 14 Jan. 1755, 25.

105. SP 41/36, 13, 14 Oct. 1743.

CHAPTER 4
WAR, PEACE AND REBELLION, 1755 - 1783.

As seen from London, the aggressive stance taken by Britain's North American colonists and the French regime in Canada required little more effort than an expeditionary force such as was fitting out under Braddock's command, to put matters right. There was as yet no general feeling that resumption of the broader dispute for empire was imminent, so that, apart from issuing the stores for the North American expedition (all met from existing materials), the Ordnance moved but slowly towards a resumption of small arms production. The stores were very full of arms returned from the regiments which were being converted from wooden to steel rammers, and there was little urgent need for a new production until such time as the army might be considerably expanded.

Early in December, 1754, the Board ordered Waller to be issued with 2377 barrels, double bridle locks and stocks to be rough stocked, and then set up with steel rammers. In addition, 13,000 of the wooden rammered muskets [Pattern 1739] then in store were to be altered to steel rammers by the Small Gun Office workmen, and in connection with this project contracts were let in mid-December for 11,700 cast brass nosecaps, and brass for sleeving 7000 forepipes.[1] Later in the month it was decided that 10,000 new arms should be produced, and letters were written to the Birmingham components makers. Waller was to supply 5800 Land Service and 4200 Sea Service stocks for immediate use, as well as 10,000 more in six month's time, and another 16,000 with twelve month's seasoning.[2]

Before this programme could be embarked upon, a major shake-up was to occur within the framework of the Ordnance System, which demonstrated the growth in the power which the Board was now able to wield within the guntrade, and the Board's ability to back up its undertakings in the face of opposition from that trade.

On 17 March 1755 the Board directed that gunmakers James Barber, Charles Pickfatt, Richard Wilson and John Hirst be written to

> to know what number of Rough Stocked Land Musquets for Steel Rammers each of them will undertake to set up and Deliver into ye Stores at the Tower p Month to pass the View as usual at the price of 6s each as settled in 1750. [3]

A joint reply from Barber, Pickfatt and Wilson was received by the Board on the 19th stating that they could not do the setting up for less than 6/8 'as the hands they employed during the late war had gone into other trades' nor can they estimate monthly production.[4] While the alternative employment of key personnel may have been a perfectly honest reason for the counter-proposal, yet it proved, for these gunmakers, a singularly badly timed ploy, as did their failure to attempt an estimate of delivery times. A fortnight later the remaining gunmaker, John Hirst, sent in his response to the Board's letter, offering to set up two thousand muskets with steel rammers in six months, and requesting protections [from the press gangs] for his workers. The Board accepted his proposal and granted the protections.[5] Although it was long before the days of labour unions, it was not long before the 'combination' whom he had cut out were after him. On 29 April Hirst wrote to the Lieutenant-General of the Ordnance saying that

> the Gunmakers are endeavouring to get away his men because he would not enter into a Combination with them to advance the price of setting up Musquets and [,] as he is informed[,] intend to give in Proposals for setting them up at a less price than what he is allowed[,] which cannot be done in a sound workmanlike manner [,] and are using their utmost Endeavours to distress him... [6]

The Lieutenant-General (Sir John Ligonier) backed him to the hilt, saying that 'as Mr Hirst was the means of keeping down the price at the first he should have all proper Encouragement.' [7] The Board backed the decision and never had cause to regret it. Thomas Hatcher, the

Master Furbisher, also seems to have been involved in the unrest amongst some portions of the workforce, and may have been connected with the 'combination.' At any rate the Board felt contrained to warn him that they

> do strictly forbid him to raise or promote any Disturbance either among the People employed in the Small Gun Office or out of the Office among the people of the Gun Trade [,] but that they expect he will attend his Duty constantly and do all he can to forward the Office Business.

Hatcher was also warned against putting his work as an inspector of East India Company arms ahead of his Office work, or having any connexion with the external trade without the express permission of the Board or the Surveyor General. [8] Hatcher had been a private gunmaker in Whitechapel since 1744, and an inspector for both the Hudson's Bay Company trade guns and the East India Company's arms before taking over Wooldridge's tasks, [9] and had obviously been too much concerned with outside work at a time when the Board required his complete attention. As a result of the Board's decision concerning Hirst, the London gunmakers were cut out of the Ordnance System, except possibly as sub-contractors whose names do not appear in the Ordnance records, and between them the Wallers and Hirst rough stocked and set up all of the contractor-made arms until the late 1760s; this does not include complete arms turned in by a number of makers, as had always been the case. The only one of the London 'combination' who managed to work his way back into the good graces of the Board during the war was Richard Wilson, whose production capacity was so large that, perhaps, the Board could not ignore him. A few new names amongst the London trade- Michael Memory, John Bumford, John Brazier, Richard How, Joseph Buckmaster, Thomas Henshaw and Henry Hadley, set up varying numbers of arms for the Board in 1756-7, but the numbers were insignificant when compared either with Hirst's production or the totals produced during the war.

As in 1739, it was not until after the official

declaration of war, in May, 1756, that the Ordnance entered into large-scale manufacturing arrangements with their contractors; and, as in 1728 and 1739, the gap in production presented the opportunity to make changes to the design of a number of features, this time in a number of different types of arms. Probably the first of these to be implemented was in the area of Sea Service arms. We have already discussed the alteration work which, although authorised in 1746, had not been commenced until at least four years later, but in addition to this a major change in both muskets and pistols was introduced during this period which involved a change in the shape and size of the sidepiece and the lockplate. This was the elimination of the third screw securing the lock in the stock, at the tail of the lock, and the adoption of the same design and location as used on Land Service arms for the placement of the two remaining sidenails. The sidepiece now took the same outline form as for the Land Service series, but was flat on its surface rather than rounded, and inlet flush with the stock. When new contracts for locks were made in 1756-7, they were all for the new pattern two-hole type.

The arm which was subjected to the most important changes was the Land Service musket,specifically to the Long Land version. These modifications in design were the most important since the original King's Pattern of 1728, for they incorporated changes made in the Pattern 1739, as well as those begun in 1749 before new production ceased, with several entirely new features adopted in 1754-5 for the forthcoming production. It is therefore reasonable to assign to this virtually all-new design a model designation, that of Pattern 1756. Perhaps the most noticeable changes were made in the stock: beginning with the Pattern 1728 the walnut stock had been made with a very thin, elegant fore-end, and the butt was finished with a high comb with rounded sides and a deep hand-rail effect on the sides; the swell at the tailpipe was pronounced and ball-like in shape, and the lock and sidepiece flat were ornamented with elaborate raised

elliptical 'aprons'. On the Pattern 1739 the forward pair of 'aprons' had been dropped, but all other features were unchanged. In 1749 the steel rammer had been officially adopted, and a cast-brass nosecap had been produced as part of the conversion unit which also included a retaining spring for the tailpipe and a sleeve or collar for brazing into the forepipe. On the Pattern 1756 the stock was made altogether heavier, thicker throughout the fore-end area, with a longer less pronounced swell at the tailpipe, and with the comb of the butt made less high, with thinner, flat sides and less of a grooved effect to the hand-rails. The lower, rounded, portion of the butt was made slightly heavier; the raised areas on the terminals of the lock- and sidepiece-flats were re-shaped with a plain rounded line following that of the lockplate at the front (as already done on the Pattern 1739) and a plain teardrop-shaped extension at the rear. A heavier type of brass nosecap was adopted along with the steel rammer for all new production, and a new long, tapered forepipe with a flared mouth, called the 'trumpet pipe' was adopted for the foremost rammer pipe, smaller in its diameters and bored internally expressly for the diameter of the steel rammer; the retaining spring in the tailpipe became a standard feature. Apart from the new nosecap and trumpet pipe, the other furniture remained unchanged. The lock also underwent changes in design. All internal parts were now to conform closely to gauges, and the lockplate was re-shaped with a straighter lower edge, doing away with the dip at the rear, the so-called 'banana' shape. From 1756 the Long Land musket lock was 'improved, better filed, and all their parts made to particular Gauges.' [10] The bayonet was unchanged in its dimensions, but the base of the socket was now forged with an integral raised collar, and the apron around the base of the elbow on the socket was abolished and the area formed as a plain surface. The Pattern 1756 (with the several additional changes made to the design of the lock in 1764 and 1778) was to remain the standard for the Long Land Pattern

musket until its production finally ceased in the late 1790s.

During the same period that changes were decided upon for the Long Land musket, it was determined that an entirely new pattern of musket should be produced and supplied to the marines, who were finally officially established as a permanent force by an Order in Council of 3 April 1755, with a basic establishment of fifty one hundred man companies. The muskets produced to a special pattern for the marines in 1748 had never been issued to them, since they were shortly afterwards disbanded at the cessation of hostilities, but it would appear that from the alacrity with which the Board met the demands for the initial issue of marine muskets early in 1756, the older arms were issued at that time. As one might expect of a 'sea soldier's' musket, the new arm was a simplified version of the Land Service musket, with no suggestion of the 'Sea Service' in its design beyond simplicity, ruggedness and comparative cheapness in finish and cost. Apart from the Short Land Musket for Dragoons, the Marine musket of 1756 was the first widely distributed musket to use the shorter 42-inch barrel. The furniture combined old and new features: the barrel-shaped rammer pipes were the usual pattern; until 1759 all were made with wooden rammers, without nosecaps or tailpipes, but when the steel rammer was introduced on those for the militia in 1759 a nosecap, trumpet forepipe and tailpipe were added; the trigger guard was the standard Land Service design; the thumb piece was omitted. The buttplate and sidepiece were of a new pattern and distinctive to this new arm: the sidepiece was in outline identical to the Land Service sidepiece, but it was thinner, with a flat surface, and inlet flush with the level of the stock; the buttplate was made with a much shorter tapering tang with three slight steps, and secured by a simple screw rather than with a cast-on lug and pin arrangment. The lock was the conventional Land Pattern, but it seems likely that available stocks of old, pre-1756, locks would have been

used at least on early production. The bayonet was the conventional Land Service pattern. The first warrants for sets of the distinctive Marine musket furniture were issued in October, 1755, and the first of Waller's warrants to rough stock them was issued on 8 September 1756. Before they had got very far along in the production process, the Militia Bill of 1757 was passed, and it was decided to issue this same musket to the newly raised militia. Although the new arm was referred to as the 'new Pattern Short Musquet for Marines' in December, 1756, by the time the issue stage was reached it had acquired the designation 'Marine or Militia Musquet' which it was to retain; production last occurred during the early years of the American War, by which time the Short Land musket had been generally adopted and was considered close enough in design to serve for the several arms of the service.[11]

The appearance of a distinctive carbine for the Royal Artillery has already been discussed, and the Artillery Officer's fuzee with bayonet reappears in October, 1755, when two new companies are ordered raised, for which 24 Officer's carbines & bayonets as well as 182 carbines & bayonets for the men are required.[12] The rough stocked officer's carbines were delivered by Waller in April, 1756, and the men's carbines were set up by Pickfatt and John Bumford under warrants of March, 1756.[13] These Artillery carbines were to come into wider issue in the course of the war, being served out to highland regiments and other units acting as light infantry. The shorter 42-inch barrel was combined with a carbine bore, a wooden rammer, and a set of smaller, simpler, lightweight furniture to produce a much handier weapon for the use of mobile troops. Although the non-specific nature of the records makes it difficult to be certain, these 'Artillery & Highlanders' carbines probably formed the bulk of carbine production during the Seven Years' War.

The most distinctive and elegant carbine to appear at the beginning of the war was that for the Horse Grenadier Guards (usually known simply as the 'Horse Guards' or

'Blues'). In July, 1755, '6 Firelocks and Bayonets for Serjeants (as delivered to His Royal Highness the Duke's Regiment of Dragoons)' were ordered for the 2nd Troop of the Horse Grenadier Guards.[14] During the next half-year the original idea was expanded, and by the end of December Thomas Hartwell was given 'sole direction' of the carbines and pistols for the Horse Guards, and they were now intended for the entire regiment, not simply for the serjeants.[15] Isaac Kelso got the job of rough stocking and cleansing off these arms, and the amounts recorded were 371 carbines and 381 pairs of pistols; it was noted that they were 'Stocked with Extraordinarily Good Walnuttree & more labour bestowed to finish them' so that Kelso's request for an increased price for the work was granted.[16] The 'Blues' carbine, like the common carbine for the cavalry, is 'home-stocked', that is, with the wood of the fore-end coming right to the muzzle of the barrel, and not intended to take a bayonet, and has a 37-inch carbine-bore barrel, with a brass blade foresight. But there the resemblance ceases; the 'Blues' carbine has a new style of lock with a flat, bevelled-edge lockplate and cock, and a flat, bevelled edge sideplate resembling those popular on fowling pieces of the period; like the fowling piece, it also has elaborate shell-carving rather than a conventional elliptical 'apron' at the tang of the barrel. The trigger guard is of the Land Pattern, but with the front terminal of the bow made thin and pinched-in, not intended to take the screw for a lower sling swivel; the swivels are omitted in favour of a sling bar mounted on the left side of the stock, secured at the rear by the rear sidenail, and at the front by a screw through the stock from the right side, just to the rear of the swell. Originally fitted with a wooden rammer and barrel-shaped pipes, later production used a steel rammer with a trumpet forepipe. As for the 'Blues' pistol, there is no clear reference to it in the records, but from a single example with features highly similar to those of the carbine, it may be described as also having the new style of flat lock

and cock, the shell-carving at the tang, and being fitted with a distinctive 10-inch pistol-bore barrel, and the older, more elegant style of 'long-ear'd' or masked buttcap.[17]

Another new carbine appeared at this time, that for Light Dragoons. The nature of the record keeping is such that it is often impossible to clearly differentiate between the several different patterns of carbine introduced during the Seven Years' War, and the first suggestion that a separate carbine and pistol for Light Dragoons might exist came with the augmentation order of 2 February 1756 which specified that each of the eleven new troops were to receive 65 carbines & bayonets and 72 pistols;[18] a further reference of late 1758 indicates that only the light companies of the dragoons had been so armed.[19] The carbines have been identified from existing specimens as having thirty-six inch carbine-bore barrels, with furniture of the usual Land Pattern but reduced in size, excepting the trigger guard bow which is like that for the 'Blues' carbine, not being intended to take the screw for a sling swivel. A sling bar is fitted along the left side, again exactly like that on the 'Blues' carbine.The lock is of the conventional rounded-surface 1756 pattern, in carbine size with the lockplate measuring 6"x 1 1/16" as compared to the 6 7/8" x 1¼" of the musket. The stock is of the conventional Land Service pattern, but slightly built, on the lines of the Artillery carbine of the period. Originally made for wooden rammers, some were later converted for steel rods by fitting a composite trumpet forepipe and retaining spring in the tailpipe.[20]

All that can be determined from the records about the Light Dragoon pistol is that 9849½ pairs of Land Service pistols were rough stocked by Waller and 9627 pairs set up by Hirst, but there is no indication of how many of these were of the conventional 12-inch barrelled dragoon pistol with the 'long ear'd buttcap' introduced in 1738, and how many of the new 9-inch carbine-bore barrelled Light Dragoon pistol with a 'short-eared' buttcap; in addition

to these features there were a number of other design innovations. The sideplate was flat and inlet flush with the stock, and of a simple pattern perhaps described best as the letter C lying open side down at the front, and open side up at the rear; it was to be used on several other types of arms in later years, most notably the Baker rifle from 1800. There was no trigger plate, but a small iron nut inlet ahead of the trigger into which the barrel tang screw was threaded. The front finial of the trigger guard was of a plain tapered design also used on the current Artillery carbines. A wooden rammer was used, with a single barrel-shaped pipe about midway along the rod channel, and there was neither thumb piece nor nosecap. The lock was of the 1756 pattern, the lockplate measuring 5¼" x 15/16", which is distinctly smaller in both dimensions than the 'heavy' dragoon pistol, although of the same design. No Land Service pistols of any sort were supplied by Waller or Hirst before 1758, and the majority of the Light Dragoons pistols reported today bear lock dates from 1759.[21]

While it may seem strange that attention should have been given to the development and introduction of a whole series of subsidiary arms just at the time when a renewal of war was clearly anticipated, it should be remembered that the Ordnance was particularly well supplied with Land Service muskets, there being well over 100,000 in store at the beginning of 1756;[22] it was, perhaps, an example of shrewd timing and perception on the Board's part, to cater for the requirements of the various and increasing specialist branches of the armed services at the moment when financial backing was least likely to be cavilled about or withheld.

Despite the healthy state of musket stores, steps were being taken to re-establish a large scale manufacturing programme. As early as February, 1755, the Tower gates were ordered to be opened 'as soon as the men could see to work'[23] and in March warrants were ordered to be drawn for the rough stocking of 2000 Sea Service

muskets and 200 musketoons, the repairing of 500 Sea Service musket barrels and 200 musketoon barrels, and for two Birmingham barrel contractors to supply 2000 musket barrels each.[24]. In May 3000 Bright Sea Service muskets were ordered to be repaired, as there were none serviceable in store[25] In July Waller received his first warrant to rough stock 1000 Long Land Pattern muskets, followed a month later by another to rough stock 1000 each of Bright and Black Sea Service muskets.[26] In September Hirst entered the operation, receiving warrants to set up 500 Long Land and 500 Sea Service muskets, followed in October by additional warrants for 3000 Land and 2000 Sea Service muskets; also in October Waller was warranted to rough stock a further 1000 Long Land muskets.[27] At the end of October Hirst informed the Board that he had thirty-four men constantly employed, and that in a little time he will be able to set up one thousand arms per month; the Board replied that he would be supported. The figure of thirty-four is probably for sub-contracting firms, not for a total of workmen, and it is interesting to note that, some years later in defending his devotion to the Board's work, Waller also claimed that he had about 40 'men' working for him during this war.[28] By December the programme was escalating, and the Board minuted that 10,000 arms were to be got up and Richard Davis, described at the time he joined the Small Gun Office staff in 1753 as 'the best Gun Lock Maker in London' was sent to the Birmingham lockmakers to ensure that their tumbler tools, screw plates and taps were all made to the same gauge; in addition to rough stocking a further 1697 Long Land muskets, Waller was to furnish 5800 Land and 4200 Sea Service rough stocks for immediate use, and a further 10,000 Land with six months' seasoning and 16,000 with twelve months' seasoning. By the end of 1755 the Board was expecting some 5600 Land muskets and 4000 Sea Service muskets in the rough stocked state, of which 3500 Land and 2500 Sea Service were already ordered to be set up; almost 1600 sets of furniture for the new Marine

musket were on order, and the ground work was laid for the expansion which would occur in the coming year.[29]

Early in the new year the Surveyor General gave his opinion that 20,000 Long Land and 5000 Short Land muskets should be prepared for stores, and warrants were ordered made out; the list is given as illustrating the new names amongst the contractors, and those considered most worthy of the Board's patronage:

	Musket Barrels			New Pattern Locks
	Long	Short	Total	hardened & engraved
J. Oughton	4000	2000	6000	
E. Jordan	3000	1800	4800	4800
B. Willet	2200	200	2400	2400
H. Hadley	3400	200	3600	3600
S. Galton	3400	400	3800	3800
J. Farmer	4000	400	4400	4400
W. Grice & R.Edge				6000
	20,000	5000	25,000	25,000

William Sharp	nails and triggers	25,000
Hartwell & Mayor	sets of brass furniture	25,000 [30]

George Markbe, one of the gunsmiths who had carried out the 1740 survey on regimental arms, was now sent to Birmingham as resident Viewer to inspect all barrels and locks produced there.[31]. In February, for reasons neither recorded nor obvious, ten London gunmakers were given small orders for setting up a total of 850 Land Pattern muskets and 182 Artillery carbines; Messrs Pickfatt, Wilson, Gandon, Bumford, Brazier, Hall and Memory each received 100, while Collumbell, Buckmaster and Henshaw received 50 each, with Pickfatt and Bumford dividing the carbines between them.[32] The numbers are too insignificant to be considered as 'sweeteners' for slighting them in favour of Hirst, and too small to

represent an important element in the Board's planning, so the motive for placing the orders must remain unexplained. Other contractors new to the Board requested, and received warrants for setting up arms as the production programme expanded, and may be explained by a desire on the part of the Board to hedge its bets in case Hirst could not cope with the enlarged numbers. Most of these smaller firms did not contribute more than one contract, and their total contribution, made almost entirely before 1759, amounted to no more than 11,800 out of the 304,800 arms set up during the war. However, there were a number of other new firms amongst the components contractors who did add considerably to the overall production throughout the course of the war, and who do not appear on the initial list of early 1756 quoted above. Some of them appeared late in 1756, but most came in during 1757, by which time the structure of the production programme seems to have been settled in the collective mind of the Board. Chief amongst these were John Whately junior of Birmingham, who supplied barrels second in quantity only to Joseph Oughton, and the partnership of Haskins & Vernon, who supplied locks second in quantity only to Grice & Edge. Partnerships between individuals already established in their own right as manufacturers play a major role in supplying the Ordnance during this war; apart from those already mentioned, Farmer & Galton were third in the quantity of barrels supplied, and fourth in the list of lock suppliers, while William Grice & Son were fourth in numbers of locks supplied. When the totals are studied as a group, it is clear that one rough stocker, one setter up, one furniture supplier, five barrel makers and seven lock makers supplied the Ordnance with the vast majority of their production during this war.[33]

Despite the achievements of the Ordnance System during the course of the Seven Years' War, the Ordnance early resorted to the purchase of foreign arms. While the System was still getting into its stride, in August, 1756, Messrs Charles Pye and George Cruikshank were paid for

5001 Dutch muskets & bayonets bought by them at Amsterdam for H.M. Service.[34] In October, 1759, when there was no apparent reason for doing so, a further 10,000 were purchased by one Henry Guignard, which were clearly second-hand arms, many of which required repair work.[35] Unlike the arms bought during the previous, and the succeeding, war these were clearly not made to an English pattern, but were bought in the market place.

As usual when the relations between England and France became tense, the Irish Government reacted with feelings of great insecurity in the face of a potential French invasion, and indeed with the perpetually run-down condition of the Irish Establishment and the hand to mouth financial existence which it led, there would seem to have been reason for some concern. After long periods of neglect and unconcern, at the first intimation of possible invasion, or of the draughting of troops from the Irish to the English Establishment, the Lord Lieutenant was always quick off the mark to request a substantial shipment of arms and military stores from the London Board, and these requests from Ireland always arrived when the Board was having to cope with large numbers of requests from regiments for replacement arms, as well as for arms for newly raised regiments and for equipping overseas expeditions; the present situation was little different except that the Board happened to have a very full store of arms. Although the Board always felt compelled to furnish the requested arms and supplies, the problem of payment was perpetual; thus, although requested to send £16,962.9.0. for 7000 muskets and bayonets and other stores shipped to Dublin in April, 1755, and a further £700. for 400 dragoon muskets and bayonets despatched in April, 1756, the bills were still outstanding in 1758.[36]

By May, 1756, the lockmakers in the Small Gun Office were so busy that Hirst had to do his own lock repairing work; John Wood, lockmaker of Wednesbury sent in some double bridle locks of the old pattern from the last war, which were fit for service and in the soft state, along

with a slightly larger group of same which were defective. Their workmen were so occupied that the Board, while accepting the soft locks which would have to be engraved and hardened, refused the defective ones, and told Wood to remove them.[37] This is all the more surprising in that the very next month the Board were complaining that the gunmakers were being dilatory, and that if they did not speed up their deliveries the warrants would be recalled. Some interesting replies were received: Willet said that he had sent in three parcels of locks, but had not heard whether they had yet passed the View; Farmer & Galton said they were waiting for a lock viewer to be sent to Birmingham with the proper gauges. (Where was Markbe, who had been ordered to Birmingham in January?) Edward Jordan replied that John Wood and others had got several of his men away from him. Thomas Hartwell was ordered to explain why Richard Davis had not been sent, and exactly to whom and when the Pattern Locks had been delivered, and why Willets had not been informed about his locks.[38] Regrettably, Hartwell's report must have been rendered verbally, although by July it is clear that Markbe's responsibilities had been limited to barrels and bayonets, and perhaps Richard Davis had not been sent on his way as soon as the Board had assumed he had. Between January and December, 1756, Hartwell and Mayor delivered in 21,550 sets of brass furniture for Land Service muskets, including the new trumpet forepipe, as well as 5000 sets for Sea Service muskets and 1200 sets of carbine furniture. The balance of their 1756 warrants, amounting to 9450 sets of Land musket furniture, were delivered by the end of May, 1757.[39] But for all of the preparation which had gone on during 1755, the results during 1756 still indicated that the System was very much still trying to find its stride, and although we have some evidence of the Board's dissatisfaction with some aspects, it is not otherwise clear from the surviving evidence how much of the apparent delay was expected, and how much was due to factors which the Board still needed to resolve.

Part of the troubles may have been the question of price; there is no doubt but that a good part of the workmen in the trade were working on East India Company orders, which were better paid for a slightly lower standard of work, and too many of the Birmingham trade were engaged on an order for the Irish Board of Ordnance of 3000 musket barrels and locks which were of the same pattern as those for the English Board, 'but not quite so good'; so on 2 October the Board granted a price increase, which allowed 8/6 for a musket barrel as against 7/-, and 7/6 for a musket lock, compared with 6/-. The allowance for flints was also increased from 12/- to 14/- per thousand.[40] By early January, 1757, Waller had delivered in 25,000 rough musket stocks, as well as some 10,000 rough stocked Long Land muskets, 3000 Bright Sea Service muskets, along with another 5700 whose finish is not specified, 5000 Marine muskets, and 1100 pairs of Sea Service pistols. Of the Long Land muskets, Hirst during the same period set up 6473, as well as 600 whose length was not specified, 3500 Bright Sea Service muskets, with another 2000 of unspecified finish, as well as 776 carbines. Hirst had certainly achieved his announced intention of being able to furnish 1000 arms per month.[41]

On 2 March 1757 Colonel James Prevost of the 60th (Royal American) Regiment was paid £900. for having purchased

> '300 Riffle Barrel Carbines with Steel Ramrods Screws and Bayonets, Ten Moulds each to cast twelve Balls at a Time and 150 Riffle Moulds furnish'd by him for the Use of His Majesty's Troops pursuant to the Right Honble the Earl of Loudoun's Warrant datd 3d Do.'[42]

Prevost had previously been in the Dutch service, and at the time this purchase must have been made he was on a recruiting visit in Germany, so that both from previous knowledge and proximity at the time, there seems little doubt but that the rifles purchased by him would have been of German, or possibly Liège, origin.[43] This was the first large-scale acquisition of rifles for the British

service, and references throughout the North American phase of the Seven Years' War indicate that they were in use in the northern and central campaigns from at least 1758 onwards, where they were issued to selected individuals in the regular British regiments.[44] As with the 1746 purchase, the motivation appears to have come from European experience and not American evidence, apart from a general appreciation that rifles were useful in wooded country for skirmishing purposes. On the Ticonderoga campaign in 1758 they seem to have served largely as food-getting tools.[45]

By April, 1757, the stocks of components appear to have been sufficient and the problems surrounding their accumulation to have been resolved, and the Board could think in more expansive terms about large-scale completion of arms. This, at least, is the situation as indicated by the surviving evidence, but exactly why it had taken them so long to reach this stage is not made clear; at least fifty percent of the contractors were local, and no delay in communications could occur when they were literally just round the corner; it may well be that by this time the work being done for the slave trade and the East India Company was completed, releasing workmen for the Board's work; given the slow pace at which all governmental machinery moved during the Eighteenth Century the elapsed time may have been considered acceptable if not entirely satisfactory, and the threat of cancelling warrants may not have been as serious it appears on the surface. At the beginning of the month John Hirst offered to set up 20,000 arms per year, and by the middle of the month Thomas Hartwell was able to report to the Board that various contractors had also sent in their offers; these included the Wallers who would rough stock twenty to thirty-thousand arms 'provided they are not hindered for want of Barrels & Locks', Hirst's offer being conditional upon not being 'hindered by the want of Rough Stock'd Guns, brass Work and other materials'; Mayor & Co. would supply from twenty to forty-thousand sets of brass furniture, while

William Sharp was willing to contract for 'any number' of steel rammers, springs, and sets of nails and triggers for from twenty to fifty-thousand; Peter and James Esdaile would supply 18-hole cartridge boxes and any sort of bayonet scabbards required, also from twenty to fifty thousand in the year. The Board ordered that contracts be let for 20,000 of each sort, and that the contractors nominate two securities to be bound with them for performing their contracts, and in financial penalties for failure; these penalties amounted to £2000 for Hirst, £1000 for the Wallers, and £500 each for the others.[46] In June another of the small-scale agreements with the London makers was made, and an informative comparison recorded of their previous year's work:

	Number proposed in one year	Number set up last year
Richard Wilson	5000	574
John Bumford	4000	836
Richard How	1500	250
Joseph Buckmaster	1200	250
Michael Memory	1500	500
Thomas Henshaw	1000	50
John Hirst by contract	20,000	
	34,200	19,963

and it was further ordered that Buckmaster, Bumford, Henshaw, How and Memory be granted warrants to set up muskets 'as fast as the Rough Stocked Musquets come into Store, so as not to interfere with Mr Hursts Contract.'[47] Three points are raised by this curious arrangement: why did the Board bother with these small orders when they were satisfied with Hirst's output; why, in the face of such poor results during the previous year, did they agree with these men again; and how, if the Wallers were to deliver in 20,000 rough stocked arms, were these other setters up to avoid interfering with Hirst's production of the same number of arms? The question of keeping the London trade 'sweet' may have played a part,

since these men were amongst the best able to execute larger orders, and it must be assumed that giving them work did not interfere with Hirst's own workforce of sub-contractors. Was the Board's optimism warranted, and did these men carry out their contracts? The records justify a negative conclusion. Buckmaster delivered in 248 arms, Bumford managed only 200,Thomas Henshaw made no deliveries, Richard How delivered in 1070 arms, Michael Memory only 610 and Richard Wilson more than completed his work with a total of 5910 arms during the year.[48] It is not surprising to find that this is the last year in which these men, with the exception of Richard Wilson, were employed by the Ordnance. Under the terms of the arrangements made with the standing contractors, the results were far better. During 1757 Hartwell & Mayor provided 10,000 sets of brass furniture for Marine muskets, 2000 sets for carbines, 5400 for Sea Service muskets and 4500 set for Sea Service pistols, while the Wallers delivered in 26,000 rough stocked Land and Marine muskets, 5000 Sea Service muskets, 300 musketoons, 1024 unspecified carbines and 900 for the Artillery, as well as 624 Highlander's and 28 Artillery Officer's fuzees. Of these, Hirst set up during the same period 23,382 Land and Marine muskets, 1500 Sea Service muskets, 500 musketoons, 2500 unspecified carbines and the 624 Highlander's, as well as 700 pairs of Land and 1500 pairs Sea Service pistols.[49] The slightly higher numbers recorded for setting up than for rough stocking are normally accounted for by the rough stocked arms being already in store.

Mention of a specific Highlander's carbine, 624 of which were produced during 1757, introduces the special subject of distinctive arms for the Highland regiments. It is during the Seven Years' War that these special regiments were first raised in any quantity. The first small companies of Highlanders had been raised in 1725, but these had accounted for only 285 muskets & bayonets, with an augmentation in 1727 totalling another 336.[50] There is no suggestion that these were in any way special

arms, but the imprecise record-keeping of the time leaves this at least open to question. With the raising of the Royal Highland Regiment, which became the 42nd Foot (the Black Watch) in 1739, we have the first indication of a special arm, for Lewis Barber furnished 229 complete muskets and bayonets for 30/- each 'to the Pattn of Lord Crawford's regiment' rather than to the King's Pattern, in May, 1740.[51] Here again the reference is to muskets and bayonets, not carbines, but as with Lord Loudoun's carbine and bayonet of 1745, these are assumed to be of a lighter weight than the King's Pattern, and, being slightly cheaper, are also assumed to be of somewhat lesser quality as is the Loudoun carbine. That Crawford's muskets were something out of the ordinary is further suggested by an order from Thomas Hollier in June, 1746, for 165 'Flatt Bayonets' for Lord John Murray's (the 42nd) regiment.[52] Because of the light infantry context in which all Highland regiments were held at the time, the special nature of their arms is considered to be concerned with lightness and facility of use, suggesting at the very least a shorter barrel and slimmer stock with less decoration, and with lighter weight and perhaps less brass furniture (e.g. the omission of the nosecap and thumbpiece). The next highland troops to be raised were two battalions, Fraser's and Montgomery's, by a warrant of 14 January 1757, at which time it was specified that each was to have '1040 muskets & bayonets with wooden rammers, and 1080 sidepistols with straps.'[53] The wooden rammers at a time when the line regiments were being equipped with steel rammered muskets, is indicative of the official attitude on highlander's arms, and this is also the first mention of the distinctive highland side-pistol, with its all-metal 'ram's horn' butt and archaic form of fluted barrel and ball trigger without a trigger guard. However, these pistols, worn singly as part of the highland garb and generally regarded more as costume than handgun, were never manufactured for the Ordnance, but were always 'paid for in lieu' and supplied by the colonels of the

respective regiments. During the Seven Years' War period the colonels were allowed 16/6 per pistol, and payments for them are scattered throughout the Bill Books and Treasurer's Ledgers.[54] Early in 1762, William Grice informed the Board that large numbers of the these pistols had been, and were being made in Birmingham, 'both in iron and Walnuttree Stocks which are of a very bad sort,' for which the purchasers were paying no more than 18/- the pair (as opposed to the allowance being made of 16/6 each). Investigating the allegation, Thomas Hartwell reported to the Board that a pair of pistols (he does not say highland pistols) cost the Office 35/4 per pair. The Board therefore ordered that for this particular warrant of 10 November 1761 to Maclean's Royal Highland Volunteers regiment the 648 pistols should be issued from the Tower 'and not paid for in Money (as formerly practiced).'[55] This is the only instance in which these side-pistols are not mentioned specifically as having been paid for in lieu, and there is no further evidence in the records that such pistols were available for issue from the Tower, or that they were manufactured for the Board. Hartwell's reference to the cost would be based on the evidence of a pattern made to determine a fair allowance to be made which was a standard practice, and the Board's minute to issue them from the Tower is typical of the broad directives given before checking with the storekeeper's department to see if such stores actually existed; Hartwell or Hatcher were frequently having to inform the Board that no such arms as called for in a specific warrant existed.[56] At a time when few other carbines were being distinguished in the records it is probably significant that the 624 carbines with bayonets for Highland companies which were rough stocked by Waller using barrels repaired and altered for bayonets, and locks repaired by Hirst in August, and set up by Hirst in September, 1757, are mentioned by name; it is perhaps also significant that this is the last such mention, and that in its general summary of types of arms to be kept in

store, minuted in September, 1757 (see below) the Board refer to 'Carbines with Bayonets for Artillery or Highlanders' (my emphasis). It is noticeable that in the various warrants for augmentations to the earlier highland regiments, (Murray's, Fraser's and Montgomery's) the references are to muskets with wooden rammers & bayonets rather than carbines,[57] and that not until 1 May 1759 were carbines with wooden rammers and bayonets mentioned for a complete re-equipment of Murray's (42nd) regiment.[58] At the end of that month the Board state that they cannot at present supply the 42nd with carbines, and have lately sent muskets, because all previous augmentations (which they quote) have been supplied with muskets; later in 1759 several newly raised highland regiments were supplied with standard steel rammered Land muskets.[59] When Morris's Highlanders were raised in October, 1759, the warrant called for wooden rammered carbines & bayonets, and an augmentation to Keith's of the same date likewise specified the same, as did a subsequent augmentation to Keith's in December, 1759; Graeme's Highlanders raised in November, 1761, were warranted for wooden rammered carbines & bayonets, as were Maclean's of the same date, and Johnston's in October, 1762.[60] The situation of what arms were carried by highland regiments is further confused by the question of local issues from field stores; a number of units (not only highlanders) exchanged their muskets for carbines after arriving for service in North America,[61] where 5000 carbines & bayonets with wooden rammers were sent in December,1758, and a like number with Admiral Saunders' expedition sent out in November, 1759,[62] while the Highland Corps serving in Germany were sent steel rammered muskets in 1761 and 1762, strongly suggesting that this is what they were already carrying.[63] It seems safe only to conclude that highland regiments raised before 1759 are most likely to have received wooden rammered muskets, which they may have exchanged locally for wooden rammered carbines for the duration of a particular campaign, and that regiments

raised from 1759 would generally have been equipped with wooden rammered carbines, except as noted above. Side-pistols would have been carried by all these regiments for parade and review purposes, and these would have been supplied by the colonel of the regiment by private purchase, the money being re-imbursed to him at a fixed rate of 16/6 per pistol, by the Ordnance. By the time of the American War, when the shorter and lighter Short Land musket was in the hands of most troops, the highland regiments received these arms rather than carbines, and side-pistols were little in evidence beyond being paid for by the Ordnance.

By the autumn of 1757 the military and naval commitments of Great Britain had expanded considerably beyond the level perceived in early 1756, and the Ordnance accordingly increased the numbers of arms which it felt ought to be kept in store at the Tower at all times; because it gives some idea of priorities, as well as the names by which the Board thought of the different types of arms being manufactured for it, the list is given in full: [64]

Long Land Musquets with Steel Rammers & Long Forepipes			50,000
Short Do with Wood Rammers for Dragoons			10,000
Short Musquets of the New Pattern for Marines or Militia			30,000
Carbines with Bayonets for Artillery or Highlanders			5,000
Carbines without Bayonets for Horse			2,000
Land Service Pistols	Pairs		12,000
Sea Service Musquets with Bayonets		Bright	10,000
		Black	10,000
Musquetoons			2,000
Sea Service Pistols	Pairs		10,000

The number of standard infantry muskets was increased by 30,000 over the 1756 requirement, and quotas set for the dragoon and marine muskets which have not previously appeared. The absence of any reference to a carbine and pistol for the Light Dragoons is curious, especially since the evidence discussed above indicates that they were being considered, even if not yet actually

produced when this list was formulated.

To make room for the incoming new arms, and to serve the immediate needs of expeditions and replacements, numbers of older arms were removed to the stores of the several Out Ports, 3000 each going to Portsmouth, Plymouth, Sheerness and Chatham. These arms consisted of Long Land muskets with wooden rammers (2798), Dutch muskets also with wooden rammers (6207), muskets with flat locks and wooden rammers (1866) and muskets 'of various patterns' (1237).[65] Although it was never put into the official record, yet it is obvious that it was deliberate Ordnance policy throughout our period always to work off the older arms as far as possible before beginning to issue new ones. The result was almost invariably a complaint from the regiment to whom they were issued, unless an overseas administration received the largesse: they were generally glad to have anything so long as they did not have to pay for it, but the policy remained in effect.

There were no notable occurrences in Ordnance development or production during 1758, except that the lock and barrel makers finally began to deliver sizeable quantities of these two components. The partnership of William Grice and Richard Edge had supplied 15,400 double bridle musket locks during 1757, and managed 16,500 during 1758, along with 4793 Sea Service musket locks, 1501 carbine locks, 2301½ pairs of Sea Service pistol locks. James Farmer delivered 3900 Land musket locks. Edward Jordan supplied another 2145, and after his death during the year his son Thomas Jordan, turned in 2847 Land musket locks, 665 Sea Service musket locks, and 109½ pairs of Sea Service pistol locks. George Haskins, not yet in partnership with George Vernon, delivered 2000 Land musket locks, 500 Sea Service musket and 500 pairs of Sea Service pistol locks, and 85 musketoon locks. His future partner George Vernon also supplied 2000 Land musket locks along with 750 Sea Service musket and 500 carbine locks. John Willet delivered 1300 Land musket locks and 220 pairs of

Sea Service pistol locks, and his executors Tomkys & Short a further 565 as well as 1067 Sea Service musket locks, 90 'old pattern' (presumably pre-1756) carbine locks, 79½ pairs of Land Service pistol and 149 pairs of Sea Service pistol locks. Land musket lock production during 1758 totalled 31,257.[66]

Musket barrel production was now divided between long (46") and short (42") and the records are not always clear which is meant by the entry 'Land musket barrels'; however, there was a general tendency to specify only when something was out of the ordinary., to assume, for instance, that 'Land Pattern' meant 'Long Land Pattern' unless described as 'Short Land Pattern', and in compiling the figures for Land musket barrel production I have used this guideline, tenuous though it is. One of the few pieces of documentation to survive in the Ordnance records which was organized to an almost Twentieth Century degree of precision and detail is the monthly reports of the inspection of barrels carried out by George Markbe in Birmingham; these are entered in the Board's minutes from December, 1756 until December, 1762,[67] with several omissions which may represent actual absence of inspection rather than non-entry of the report. They record the number of barrels of the several types (long and short musket, Marine or Militia, Sea Service musket, carbine [not differentiated], and pairs of pistol, not differentiated), and the number 'Passed and marked' - that is passed inspection and so stamped on the barrel- and the number 'turned back' or rejected. Also, from May, 1758, the Board began to accept '2nd Grade' Short barrels, and there are entries for a very small number of '3d or India grade' being accepted in 1760. These monthly reports show that during 1758 eight Birmingham contractors listed in the order of their contributions (Whately, Farmer & Galton, Oughton, Richard Wilson [of London, but buying from the trade rather than forging himself], Thomas Jordan, Willets, Edward & Thomas Jordan, and Harris & Barker) turned in 12,689 Long Land musket barrels, 8473

Short Land, 1441 Marine or Militia, 581 carbine and 3088½ pairs of pistol barrels. The absence of Sea Service musket and the small number of Marine or Militia barrels is explained by the fact that large stocks of old and repaired barrels were still being used in the rough stocking of these two types. From March, 1755 to the end of 1758, John Hirst had repaired and/or altered 43,339 musket barrels, of which only 2872 are specified as being of Dutch origin. The repairs were mostly cutting off and new looping, some being fitted with new breechplugs, and the bores polished. During the same period he also repaired and altered for bayonets 3429 carbine barrels, including the 624 for the Highlander's carbines in September, 1757. Hirst's repair work during 1758 amounted to 5000 musket barrels, as well as 5518 musket and 1382 pistol locks being repaired.[68]

From the above it will be seen that during 1758, including Hirst's repaired products, there were 36,775 musket locks and 27,603 Land and Marine musket barrels delivered. Complementing these, Hartwell & Mayor turned in 35,704 sets of Land musket furniture and 17,700 for Marine or Militia muskets, as well as 11,254 sets for Sea Service muskets, 4212 carbines, 1748 musketoons, and 5000 pairs of Land Service pistols. From this stockpile of components, the Wallers rough stocked 19,995 Land and Marine muskets, 9567 Sea Service muskets, 76 musketoons, 570 artillery carbines, 66 artillery officer's fuzees, 1081 pairs of Land Service pistols and 3240 pairs of Sea Service pistols. Hirst in his turn set up from Waller's production 19,088 Land and Marine muskets, 6990 Sea Service muskets, 200 carbines, 200 pairs of Land Service and 2600 pairs of Sea Service pistols.[69] The figures suggest that, taken all in all, production was about level with that of the previous year, and represent a mean for the capacity of the system; no complaints are recorded from the Board during this year, perhaps indicating that they felt all was going smoothly.

The year which, before its end, would be hailed as 'The Year of Victory' thanks to Britain's naval and military achievements, was one of further expansion for the Ordnance, with new products and some new faces. The organization of contracts for the year's production began several months earlier than in 1758, and early in January, 1759, the Wallers offered to rough stock sixty to seventy thousand arms during the coming year, and Hirst offered to set up sixty thousand. The latter figure was accepted by the Board and warrants issued for that number from each firm.[70] The Board had sent Thomas Hartwell to Birmingham to 'hasten the Barrel Makers' and he had reported that he was able to obtain 4000 barrels at a shilling less than the Office price by promising the contractors that they would be paid for them as soon as they had passed View and Proof; he also recommended that an assistant for George Markbe in Viewing be found, and in February John Stewart was sent to Birmingham for this purpose.[71] It would thus appear that at least part of the problem in slow deliveries was due to the Office system of payment 'in course of the Office' by debenture, and that ready money procured ready goods. In February the Birmingham contractors sent in their replies to the Clerk of the Works' enquiry about forthcoming production; Farmer & Galton said they could supply 300 barrels and 300 locks per week for the coming year, and Whately & Son could furnish fourteen to fifteen thousand barrels; each partnership was given a warrant for 12,000 of each item offered. Haskins & Vernon, having formed a partnership since their last separate contracts, offered ten thousand locks, and Thomas Jordan offered ten thousand each of barrels and locks, which offers were accepted and warrants issued.[72] Another aspect of the difficulties facing both Office and contractors came to light in April, when Grice & Edge reported that they had just about completed their warrant for ten thousand locks, and that they were badly in need of cash; the Board owed them not less than £6,600, and they requested immediate payment of at least three of

their completed warrants amounting to £2-3000. The Board's response was, unfortunately, typical: 'Ordered that they be acquainted they will have Money as soon as the Board can spare it.'[73]

This approach, no matter how justified from the Board's point of view, coupled with the hold-ups experienced in the inspection of components and payment for them, cannot have inspired the contractors to greater efforts on the Board's behalf. The entire situation was based on the knowledge that the Board was paying a good price for the product, was ordering in large quantities, and was guaranteeing payment, but not immediate payment, and that all parties concerned in an agreement were fully aware of all these circumstances. It is enlightening to note that regardless of the vitriolic nature of some of the complaints and the responses to them, the very contractors making the complaints always came back for more when opportunity offered, and that with very rare and specific exceptions, the Board always re-employed them. It was a very small world in terms of the number of decision makers and initiators involved: the Board was the fount of all largesse, and it had very high standards when it came to accepting contractors and their work. The contractors had to choose workmen who could 'work to the pattern' and these were in a distinct minority within the gun trade, whether London or midlands, or they would risk being dismissed from the list of standing contractors held by the Board. The big variable was the availability of these particularly skilled workmen; throughout its history the gun trade has always been one of fits and starts, periods of intense activity followed by, sometimes, years of almost no work, and many of the best workmen would enter into other allied trades, which often involved moving from a gun trade centre to some other locality. Only an increase in the price of work could lure them away from other employment, and back into the gun trade; this generally meant either that the Board would have to increase its price, or that the profit margin of the

contractor would have to be narrowed. The Board did increase its prices, generally at the outbreak of a war when both raw materials and labour were at a premium, but they were always able to invoke the threat of purchasing abroad to solve their problems at the expense of the domestic contractor. The Board's loyalty to its chief contractors, such as Waller and Hirst, was always conditioned by the overall circumstances and the necessities of the moment; no matter how desirable, no man was indispensable.

On 23 March 1759 a Royal Warrant was issued for the raising of a regiment of light dragoons to be commanded by Colonel George Augustus Eliott. This was the first time that a complete regiment of this type had been formed, previous light dragoons (originally raised in 1756) being in troop strength only and attached to existing regiments of Dragoons and Dragoon Guards. Eliott seems to have had a personal interest in small arms, (see below, page 185), and his influence may have been such that it was his own design of carbine and pistol which were adopted for his regiment and subsequently for all light dragoon regiments for the remainder of our period. There was a considerable delay in the production of these new arms (initially 396 carbines <u>without</u> bayonets and 414 pairs of pistols, and by the time they appear to have been first produced, there were two additional light dragoon regiments in course of raising, which, with the unspecific nature of the production records, makes it impossible to sort out one from the other. Fortunately, two of the three patterns of carbine and pistol have been identified today and can be described. Our first glimpse of the Eliott does not come until January, 1760, when Markbe's report of barrels inspected for that month mentions, in addition to 'carbines for light troops' also 'Do. for Eliott's Light Horse.' [74]

The second regiment of light dragoons to be raised in 1759 was that commanded by Colonel John Burgoyne, the 'Gentleman Johnny' whose reputation was ruined during the

American War, but who proved a highly capable commander of light troops during the campaign in Portugal in 1762. This regiment (the 16th, or Queen's Light Dragoons) received its warrant on 10 August 1759, and was almost immediately augmented, on 15 October, thereby requiring a total of 462 carbines without bayonets and 474 pairs of pistols. A second augmentation of January, 1760, raised the arms requirements by 204 carbines and 204 pairs of pistols.[75]

The next regiment of light dragoons to be raised was that of Colonel Hales, which received its warrant on 9 November, and which was to be equipped with 292 carbines without bayonets and 300 pairs of pistols; like Burgoyne's it was almost immediately augmented, and a month later was to receive an additional 146 carbines and 150 pairs of pistols. It was further expanded by an augmentation in January, 1760, calling for a further 228 carbines and 228 pairs of pistols.[76] Aberdour's small regiment of light dragoons was raised on 12 November 1759, and required 108 carbines and 112 pairs of pistols, but no more is heard of it, and it does not directly concern this history except as requiring light dragoon arms.[77]

The final regiment of light dragoons whose raising is relevant for Ordnance history during this war was that of the Marquis of Granby, raised in April, 1760, and known as the 21st Light Dragoons or 'Royal Forresters.' It was to be equipped with 396 carbines and 408 pairs of pistols of a special pattern. As with the other light dragoons it was soon augmented, and in July was increased by sixty carbines and sixty pairs of pistols. Granby's influence as commander-in-chief of the British forces serving under Prince Ferdinand of Brunswick on the Continent is undisputed; also, a number of his men are believed to have previously served in the Duke of Cumberland's Dragoons, so that the fact that he was able to have a special design of carbine and pistol made for his men by the Ordnance, and the styling of that design, should not be too surprising.[78]

The Eliott Carbine, like its contemporary the Royal

Forrester's Carbine, went through two phases. The first of these was as a wooden rammered carbine with a 'home-stocked' or full-length fore-end not intended for a bayonet, which was produced during the 1760-1762 period. The second pattern appeared in 1773-5 and will be dealt with in sequence. The first Eliott Carbine was fitted with an automatic dog-catch engaging on the lower side of the cock, a design used previously by James Barber, from whom it may have descended to the Ordnance although Barber had not been a contractor since 1749. Its forepipe appears externally to be composite, and the mould was obviously originally made up in this way, as with other carbines of this period. The furniture is distinctive, with the Light Dragoon sidepiece, and a trigger guard which incorporates a raised lug on its lower tang that is pierced for the lower sling swivel screw, and has a longer and plainer forward finial. There is no nosecap, and the buttplate tang is similar to that used on the Artillery & Highlander's Carbine, with a short tapering, three-stepped form. The carbine-bore barrel is 28 inches in length and has a brass blade foresight inlet into the barrel near the muzzle. Most of these carbines were subsequently 'repaired' when the dog-catch was removed, and a sling ring bar of the same pattern as used on the Light Dragoon carbines fitted along the left side.[79]

The Royal Forrester's Carbine of the first production is also designed around a carbine-bore 28-inch barrel and has the same general pattern of stock as the Eliott. The most distinctive feature of this carbine is its flat lock and cock, and its flat, fowling-piece type of sideplate, both features originating on the Duke of Cumberland's Dragoon Carbine of 1746 and still in use at this time on the 'Blues' Carbine. No example of this early pattern is known at the time of writing, but a painting of a private in the Royal Forresters in the Royal Collection suggests that it may have used the same trigger guard pattern as the Eliott of this period, and seems to indicate that the fore-end may have had either a nosecap or reinforcing

band, a most uncharacteristic feature for Ordnance production of this period.[80] The Royal Forrester's pistol also used the flat lock and a reduced scale version of the same sporting-pattern sideplate; it was made with a 10-inch carbine-bore barrel, and used the old-fashioned 'long ear'd' buttcap, and had a thumb piece.[81] There was obviously some impatience to get the regment armed, for in late May the Board ordered that the arms be delivered to the regimental agent from time to time, as fast as they were completed, 'without waiting till the whole are finished', and by late October they had their complete set of arms.[82]

Whether Hales' Light Dragoons were originally issued with a carbine of special design is unknown: the records do not refer to any particular features at the time of manufacture, and no examples have been identified today. However, in January, 1764, the Tower received 506 carbines from this regiment 'which have been altered in such a manner as renders them unfit for Service,' and it was recommended that they 'may be sold at the next Sale with 35 Rifled Bullet Guns of different Patterns' which was approved.[83] The nature of the alteration is not referred to, but including them for sale with a small group of rifled pieces does suggest that it may have involved rifling the barrels, or re-barrelling them with rifled barrels, as far-fetched as this must appear. The fact of their having been altered during their extremely short service life and then passed quickly into the civilian market so soon afterwards leaves little possibility of their being positively identified today.

These light dragoon arms represent new patterns of arms introduced by the Ordnance during the Seven Years' War, and unfortunately due to the lack of detail in the records it is impossible to make any estimate of their production beyond the basic figures given in the original and subsequent augmentation warrants, all of which appear to have been complied with. Such special service arms were not normally included in the broad production programme of

the Board, and would not be expected to be found in store on demand; they would be returned into store and then re-issued to the parent unit as required, and perhaps their numbers would be completed to fill the current demand.

Overall production for 1759 showed an increase over that for the previous year. With the raising of the militia under the Militia Act of 1757 to meet the invasion threat only defeated by Admiral Hawke's spectacular victory at Quiberon Bay in November, the demand for Marine or Militia arms rose sharply, and during the year 23,000 sets of furniture for these arms were delivered; the Wallers rough stocked 27,123, and Hirst set up 26,760 of these, including 560 fitted with steel rammers, the first time this feature was applied to the Marine or Militia musket. Many of the wooden rammered arms already in the hands of local militia depots were converted to steel rods, but much of this work was a product of the post-war years. At first the Board objected to the conversion work and insisted that militia colonels or Lord Lieutenants assume the costs, but Government soon adjusted this situation and assumed the costs.[84] Land musket production achieved only a poor second place in the total output. Mayor & Co. delivered 15,000 sets of furniture, and the Wallers rough stocked 12,301 of which Hirst set up 10,249. With an invasion threatening, the production of muskets for the Senior Service might have been expected to jump, but such was not the case: Waller rough stocked only 5095, along with 3055 pairs of Sea Service pistols, and Hirst set up 6914 and 3214 pairs respectively, obviously drawing to some extent on existing stores.[85] In fact, Hirst obviously felt he had been let down, commenting early in 1760 that he had completed nearly 50,000 arms during the last year,(out of the contracted 60,000) as many as he could for want of materials.[86]

Complaints had been coming in for some time from both the army and the militia about the number of breakages in lock parts, and in December George Markbe was ordered to investigate, and the stipulate that for the future only

the best Swedish iron was to be used in making locks.[87]

Small arms production during 1760 showed an increase over the previous year, but it is not clear why this should have been the case, since it was now clear to Government that the French were losing, and it was not yet accepted that a war with Spain was even likely. Waller and Hirst were each granted a warrant to provide sixty thousand arms in their respective categories. The firm of Grice & Edge requested that either a Lock Viewer be sent to Birmingham to inspect locks before they were hardened, or that locks be hardened in the Tower and a reduction made in the price; Thomas Hartwell replied that there was no space in the Tower for lock hardening to be done, an illuminating sidelight on wartime conditions in the Tower, and recommended that a Viewer be sent. The Surveyor General ruled that a Viewer should be sent, but that viewing in the soft state in the Tower should also be continued. Thomas Hodgetts, a Small Gun Office lock maker was sent to Birmingham as Lock Viewer. Unfortunately Hodgetts did not do his job properly, and by the end of the year all locks were again to be sent to the Tower for viewing.[88] Wartime pressures were also having their effect in the Sea Service area: Hartwell notified the Board in February that the state of Sea Service musket barrels was very low, and that there were no more old barrels in store to be converted for Sea Service; he informed the Board that many of the best Land Service barrels broke in proof near the muzzle, and that these could be cut-off to 40-inches and 36-inches, and be new looped and sighted to make very good barrels. The barrel makers had already agreed to do this work, turning in the barrels re-worked for 6/6 each. The Board agreed to this arrangement.[89] A further improvement in production management was introduced in August when the Board ordered that in future whenever any rough stocked arms were issued to a Master Gunmaker for setting up, the necessary brasswork, rammers, nails, triggers and other materials were to be issued all together at the same time, and not parcelled out in small

quantities from time to time as apparently done previously. By this means the contractor would be sure of having all the necessary components available before beginning the work, and not be held up for lack of some part of them in the course of the assembly.[90] Land muskets returned to head of the list in the overall output, but Marine or Militia Muskets and carbines were prominent. Ten thousand sets each of Land musket and Marine or Militia musket furniture were delivered in, and the Wallers rough stocked 21,343 Land and Militia muskets, of which 8859 were Militia and 1494 were Short Land for Dragoons, with 10,990 Long Land muskets. Hirst set up 21,271 Land and Marine or Militia muskets, 1757 of the 6935 latter having steel rammers, and including 2218 for dragoons. Some of these latter were to be issued to many of the newly raised Independent Companies, instead of Long Land muskets with steel rammers; in other words, these new units were to receive second-line arms.[91] Seventeen sixty is also the last year in which Long Land muskets made for wooden rammers are clearly identifiable; 728 had been supplied in 1758, 966 in 1759 and a final 303 in 1760; it is possible that they were made after this date, but they are not differentiated in the surviving records. Carbine production increased to such a degree that Hirst requested and received an increased price allowance of 6/6 each 'as there is more work since so many different patterns have been made.'[92] Carbine production in 1760, which now included cavalry, light dragoon, artillery & highlander's, artillery officer's, Gentleman Cadets, Eliott's and Royal Forrester's amounted to 5000 sets of furniture (as well as 50 sets for officer's carbines), with 4886 being rough stocked, along with 14 for officer's and 42 Gentleman Cadet's carbines (for which the furniture had been delivered in September, 1759). Of these Hirst set up 4840, as well as 456 with flat locks (Royal Forrester's), the largest carbine production to date. Waller also rough stocked 7060 Sea Service muskets and 34 musketoons, as

well as 1340½ pairs of Sea Service pistols and 2425 pairs of Land Service pistols. Of these Hirst set up 6100 Sea Service muskets and 15 musketoons, 4000 pairs of Sea Service pistols, and 2007 pairs of Land Service pistols as well as 468 pairs of pistols for the Royal Forrester's, with flat locks. While these flat-locked pistols are distinguished, the Light Dragoon pistols with conventional locks, of which many have been noted with locks dated 1760, are not indicated separately, and it is impossible to determine the numbers of ordinary Dragoon and Light Dragoon pistols made.[93]

Production during 1761 witnessed a notable increase in the output of both rough stocked and set up arms. This was occasioned by a report of Thomas Hartwell in January, which stated that 40,000 new arms would be required to achieve the numbers ordered to be kept in store, and warrants were issued to the Wallers and Hirst to each complete that number of arms.[94] In addition, 4000 arms were to be sent to replace losses in Germany[95] In addition to the new arms contracted for in the usual manner, a warrant for the purchase of 10,000 arms abroad began to bear fruit during 1761; these were being supplied by one Henry Guinard, and were clearly second-hand arms bought in the market place. By July, Guinard had already delivered 2477 of these arms, and reported that he had a further 522 being repaired; although the Board said that it did not want any more of them, at least another 2200 were delivered, but many of them were entirely unserviceable. It seems unlikely that more than about half of these arms were ever delivered, and most were probably sold off directly from store at the end of the war.[96] The partnership of Hartwell & Mayor was formally dissolved consequent upon the death of Joseph Hartwell in April, and Thomas Mayor now became the sole supplier of brasswork to the Ordnance.[97] Thomas Hartwell was given yet another hat to add to the several which he already wore when the Master General appointed him Clerk of the Works and Proof Master at the Tower, replacing Ralph Ward; Hartwell was to

continue as Modeller with his son Robert as an assistant.[98] Musket production during 1761 was about equally divided between Land and Marine or Militia. The Wallers rough stocked 13,024 Long Land and 2397 Short for Dragoons, and 13,156 of Marine or Militia. Hirst drew to some extent on accumulated stores and set up 15,500 Long Land muskets, 2100 Short for Dragoons, and 13,000 Marine or Militia of which 330 were fitted with steel rammers. With the end of the North American phase of the conflict in 1760, the need for infantry carbines (primarily for the Highland regiments and other light-armed troops) eased, and carbine production dropped: the Wallers rough stocked 2784 of which Hirst set up 2419, in addition to 112 with flat lockplates for the Royal Forresters. Land pistol production totalled 1980½ pairs of pistols and 58½ pairs of flat locked Royal Forrester's pistols rough stocked by the Wallers, with Hirst setting up 1881½ of the former and 118½ of the latter. Sea Service production amounted to 4000 muskets, 433 musketoons and 2448½ pairs of pistols rough stocked by the Wallers, of which Hirst set up 4651 muskets, 362 musketoons and 2788 pairs of pistols (drawing on stores for the overages).[99]

On 9 January 1762 warrants were issued for an annual production of 20,000 Long Land muskets, 2000 Short for Dragoons, 6000 Marine or Militia, 5000 carbines (unspecified), 6000 Sea Service muskets, 500 musketoons, 2000 pairs of Land Service pistols and 3000 pairs of Sea Service pistols. In addition, 17,994 long, 5966 short and 5284 Sea Service musket barrels were called for, as well as 2800 for carbines, 365 for musketoons and 1000 pairs for pistols. The lock makers were to supply 16,417 Land Service and 21,000 Sea Service musket locks and 1723 for carbines. The precise figures indicate that these were required to bring the stores up to the agreed numbers.[100] The following month the Clerk of the Small Gun Office was ordered to prepare and pack up 20,000 Land muskets with wooden rammers, which probably represent the first of several shipments of arms to Portugal, as

England's ally in the new war against Spain.[101] Shortly afterwards a warrant was drawn for the supplying to Portugal of 26,400 muskets & bayonets, and 4800 carbines and pairs of pistols for cavalry. Early in May the Board noted that to complete the supply of arms going to the King of Portugal, 2000 muskets with steel rammers and 1000 short muskets with wood rammers were needed, and a few days later this was supplemented by 300 muskets & bayonets with steel rammers.[102] On top of this muddle, in July the Portuguese envoy de Mello requested a further 2000 muskets & bayonets which he said his king would pay for.[103] A list of October sets forth what appears to be the total quantities of arms supplied by the Ordnance for Portugal at this time: 24,400 muskets & bayonets with wooden rammers, 2000 with steel rammers, and the original 4800 carbines & bayonets with wooden rammers and pairs of pistols for cavalry. These arms were to be accompanied by two gunmakers and two gunlock makers equipped with tools and spare parts, and 2000 additional muskets & bayonets with steel rammers.[104] From this period until the late 1880s Portugal was to purchase, as well as manufacture in her own armouries, military small arms of current British patterns, with the local product being engraved on the lockplates LISBOA and bearing the crowned cypher of the current monarch.

The equipment for the expedition against Havana, Cuba, commanded by the Earl of Albemarle, was to include 'for the Engineers Rifled Barrel'd Pieces 10,' with 60 flints, 10 moulds, and three quarters of lead.[105] These are assumed to be part of those rifles purchased in 1746 and still in store at the Tower. Engineers continued to be viewed as troops suitable for carrying rifles, operating in the van of advancing forces, '...as well to establish our footing ...as to cover our approaches to dislodge the enemy from their posts.'[106]

Considering the extension of the war effort to encompass a Spanish campaign on land and sea as well as the defense of Portugal, it is extremely surprising to

note that Ordnance production in 1762 was less than during the previous year. Mayor delivered in some 15,800 sets of Land musket furniture and 16,000 for Marine or Militia muskets, 4000 for Sea Service muskets and 2000 for carbines. The Wallers rough stocked 27,124 Land and Marine or Militia muskets, of which Hirst set up 24,583, of which 3859 of the 9698 Marine or Militia muskets were fitted with steel rammers. The Waller's carbine production amounted to 6674, the largest of the war, as well as 181 with flat locks, and 50 officer's fuzees, of which Hirst set up 6814, plus 188 with flat locks for the Royal Forresters, and all of the fuzees. Land pistols produced during the year included 2904 pairs plus 89 pairs with flat locks rough stocked, with 2953½ and 84 pairs respectively being set up. Sea Service production amounted to 5398 muskets, 410 musketoons and 10½ pairs of pistols rough stocked, of which 4664 muskets, 451 musketoons and 23½ pairs of pistols were set up.[107]

With the benefit of hindsight it is possible to see that the Ordnance System, as conceived and set up during the 1710-30 period, probably operated at its peak of efficiency and effectiveness during the Seven Years' War; it is difficult to be absolutely certain because in each of the wars there were certain modifications which make precise comparisons impossible, but if the smallest number of contractors producing the largest number of products be taken as a guideline,. then this is certainly the case. During the years from 1755 to 1763, a total of thirty-seven contractors (1 brasswork, 3 rough stockers, 10 setters up, and 23 barrel and lock makers) provided some 294,000 sets of brass furniture, 249,700 barrels, 291,200 locks, 304,800 rough stocked arms, and 304,800 set up arms. And if the list of contractors is shortened to take into consideration only those who produced in significant numbers, say five-figure totals, then there was only 1 rough stocker, 1 setter up, 5 barrel and lock makers, and 4 lock makers who contributed the majority of the materials.[108] There were more types of arms produced

during this war than at any other period to date (eighteen distinct patterns with wooden and steel rammer variants for two of them), and fewer foreign arms purchased than during any other war of our period. While it is true that the Ordnance began the war with a larger stock of up-to-date serviceable arms than was to be the case again, it took less time for the processes of administration and production to get into full operation once the need was perceived. Existing stocks of arms in store sufficed to get the opening, North American, phase of the war moving (however disastrously), and little more than a year after the formal declaration of war in May, 1756, the System appears to have been functioning as its organizers intended. The achievements of the Board in productivity were enormous when the pre-Industrial Revolution state of manufacturing and the high standards of working to a pattern and to gauges which the Board insisted upon are taken into consideration. Once the combination of the London trade in attempting to keep up prices had been dealt with, and some slowness on the part of the Birmingham workers had been resolved, there were no further recorded labour problems during the remainder of the war. In satisfying the demands of the armed forces the Board probably achieved greater success than at any other time during the Eighteenth Century, although a paucity of regimental records makes it impossible to analyse this factor at its most significant level. Given the amount and types of evidence at our disposal, it seems fair to conclude that during the Seven Years' War the Ordnance System functioned as closely as possible to the ideal which its designers sought, and at a level which it was not again to achieve.

* * * * * *

The return of peace early in 1763, unlike that in 1748, brought no cessation of production on the part of the Ordnance. Apart from the very recent heavy demands of the Spanish campaign, Britain's military commitment had been much greater than during the War of the Austrian Succession, and the fighting on three continents was far more frequent and savage, with losses and damage to arms being much higher than during the previous conflict. It was therefore necessary not only to make good these deficiencies but to replenish the stocks of new arms. Despite the disbandment of dozens of regiments, the numbers of arms in Ordnance stores were considered inadequate. However, the condition of peace removed a degree of the urgency from the Board's needs, and in February, 1763, all of the contractors were written to, asking at what abatement in price they would continue to manufacture their various components for the future.[109] Most of the replies have not survived, but Hirst informed the Board that he could not set up arms for less than the present prices, and reminded them of his performance during the war; Hartwell confirmed Hirst's statement.[110] But there were those in the trade ever anxious to secure the profits of the Board's work, and punish Hirst for his success; Richard Wilson of the Minories, one of the largest and most influential men in the London gun trade, wrote and offered to set up arms more cheaply than Hirst, but the Master General (now the Marquis of Granby) and Board confirmed Hirst's agreement and condemned Wilson as one of those who had entered into combination against the Board and Hirst in 1754, in an attempt to raise prices, and as one whose contributions during the war had been small and of poor quality.[111] On the same day that they rejected Wilson's offer, warrants were issued to the Wallers and Hirst for the rough stocking and setting up of 21,170 Long Land muskets, 4000 Militia muskets with steel rammers, 2000 Marine muskets with wood rammers (this now becomes the distinction between these two variants on the Marine or Militia), 2000

carbines of sorts, 1000 pairs of Land pistols, 2000 Sea Service muskets, 50 musketoons and 2000 pairs of Sea Service pistols. Warrants were also issued to the components contractors (Farmer & Galton, Haskins & Vernon, Whately & Son, Edge & Son, Short & Co., Harris & Barker, Joseph Grice, Grice & Son and Oughton & Son) for 16,240 Long Land musket barrels, 3967 short musket barrels, 525 carbine barrels and 3903 double bridle musket locks.[112]

Rifles continued to be an item of interest to the Board, although in what precise context does not appear. At the end of the year John Hirst offered to supply rifles which, from their price, £6. each, appear to be breech loading, and the Board ordered twenty 'at the above Price and agreeable to the Pattern this day produced to the Bd.'[113] None of this tiny group have been identified at the time of writing.

With the return of peace, and of disbanded regiment's arms into store, there came the usual large auctions at the Tower of old and unserviceable stores, to make room for these returned arms and to realize what money could be had from materials no longer considered worth keeping in Government ownership. Many thousands of tons of old arms, barrels and locks passed into the civilian gun trade to be worked up into the standard African slave-trade gun of the period, and, to a limited extent, the cheaper grades of commercial arms of military pattern. Many of the customers at these twice-yearly auctions were contractors to the Board for small arms.[114]

Deliveries on the warrants granted at the beginning of the year were not up to the standard of wartime production. The Wallers produced 15,151 of the 21,170 Long Land muskets, 2800 Militia and 2007 Marine muskets, 2005 Sea Service muskets, 1978 carbines, 50 musketoons, 1009 pairs of Land pistols and only 3½ pairs of Sea Service pistols. Hirst managed to set up 14,523 Long Land muskets, 3697 Militia and 1387 Marine muskets, 2004 Sea Service muskets, 1621 carbines, 48 musketoons, 1011 pairs of Land Service pistols and one pair of Sea Service pistols.[115]

Having accepted the design of the new Marine or Militia musket at the beginning of the war, the Admiralty now found fault with it and other arms issued to the marines during the war. They had compared a Marine musket with a Long Land Pattern, and wanted the former replaced with muskets 'of army quality.' The Board admitted that due to sudden large augmentations to the marine force, Dutch muskets had occasionally been issued. They reminded their Lordships of the Admiralty that the new marine musket had been approved by them, and offered only to replace the Dutch arms still in the hands of the marines with Long Land Pattern muskets.[116] It is very unlikely that the Admiralty accepted this offer, since it would have left the troops with two different lengths of musket of quite different styles. Marine muskets continued to be made until the middle of the American War.

Late in February William Grice of Birmingham offered to clean and repair the locks of all the arms returned from the regiments, which offer the Board accepted. It was also determined to sell at the next auction all arms in store not of the King's Pattern.[117]

The Marquis of Granby's light dragoon regiment of Royal Forresters had been disbanded, and the efforts of the commander of the 16th (Queen's) Light Dragoons, John Burgoyne, to obtain Granby's specially designed carbines and pistols proved successful. A Royal Warrant was issued for the returned arms to be issued to Burgoyne's regiment after they had been cleaned and repaired. By the end of March they had been issued.[118] It was by this means that the production of these special arms was prolonged until the 1790s when another commander of the 16th introduced a more modern design.

The annual warrants for the production of small arms were not issued until April, at which time Hirst was ordered to set up 9000 muskets, 500 carbines and 500 pairs of pistols. The Birmingham contractors were to supply 3000 Long Land musket barrels, 4800 for short Land muskets, 600 for carbines, 338 for Sea Service muskets, 9 musketoon

and 110 pairs of pistol barrels as well as 6206 double-bridle musket locks, 413 Sea Service musket locks, 741 round carbine locks, 244 pairs of round pistol locks and 366 pairs of Sea Service pistol locks.[119]

In June a major step was taken which, while it may have pleased the army of the day, created great problems for the modern historian. It was decided to cease dating the locks and having the contractor's name on them, substituting simply the word TOWER engraved across the tail of the lockplate. The Clerk of the Small Gun Office wrote

> that in the late War many Gentlemen of the Army objected to such guns as were set up or repaired with Locks of a late date, which they imagined to be Old Guns, though the same perhaps had never been in Service, he [the Clerk] therefore proposed that all new Locks (instead of the makers name and date of the Year) should be engraved with the word Tower only, and also that all Old Locks, now in the hands of Mr Grice to be repaired should be altered in the same manner and likewise all the Small Arms which are sett up or repaired at the SGO.
>
> The same was Approved of by the Board & Ordered accordingly.[120]

Thus at one stroke several thousand old arms will have been modified in their lock markings, and all new production locks deprived of a certain dating. The process of altering lock markings continued whenever arms came in for repairs during the years to come, with Grice & Son and Haskins & Vernon doing most of the work not being carried out by the Small Gun Office workers in the Tower. In September Haskins & Vernon were ordered to repair all of the Extra Flat carbine and pistol locks, such as were used on the 'Blues' and Royal Forrester's arms, creating another area of confusion for the modern student.[121] Only a tiny number of locks have been noted still bearing a date of 1764.

During 1764 the Wallers produced 6322 rough stocked Long Land muskets, 4000 steel rammered Militia muskets, 89 short wooden rammered muskets for dragoons, 865 carbines, 10 carbines with flat locks, 425 pairs of Land pistols and

152 pairs of flat locked pistols which were probably for the 'Blues.' Hirst set up 5577 Long Land muskets and 4261 steel rammered Militia as well as 11 wooden rammered, 499 carbines, 1107 Sea Service muskets, 50 musketoons, 358 pairs of Land service pistols, all of the 152 flat locked pistols, 3½ pairs of Sea Service pistols and 20 rifles.[122]

With the benefit of hindsight we are able to observe that Ordnance activity, so far as it is recorded in the surviving records, was at a minimum during the next three years, almost a calm before the storm which was to follow. However, certain features of future production begin to appear, notably the increase in the orders for short (42") musket barrels. Just when a decision was taken to supercede the 46-inch barrel with the shorter version for all line infantry is not mentioned, but no concerted action appears in the records prior to 1768. The warrants for 1765 were not issued until late August, when Waller and Hirst were ordered to provide 3000 Long Land muskets, 2000 Marine or Militia, 500 Sea Service muskets, 250 carbines and 250 pairs of Sea Service pistols.[123] In October a return of serviceable arms in the several British garrisons showed 54,750 muskets in the Tower out of a total of 61,219, along with 4701 carbines of the total 5595 and 8407 pairs of pistols of the total 9079 pairs. Most of the balance were in Edinburgh and Fort George.[124] These figures doubtless explain the small quantity of new production being ordered by the Board. Waller turned in the 3000, 2000 and 500 muskets of his warrant, but produced 440 carbines and 40 officer's fuzees, along with the specified 250 pairs of Sea Service pistols. Hirst set up 4490 Land muskets, 1519 steel rammered Militia muskets, 643 carbines and the 40 fuzees, 13 pairs of 12-inch barrelled and 54 pairs of 9-inch barrelled Land pistols (one of the few detailed descriptions noted).[125]

The following year produced increased orders for Waller and Hirst, as well as for the Birmingham contractors. Whether these latter orders represent the

beginnings of the changeover to the shorter barrelled infantry arm is not clear, but they are arguably framed in that direction. It is perhaps also significant that the Wallers received two sets of warrants for rough stocking, one dated in February, and the second in April, while the Birmingham contractors had received their warrants in March. The Waller's earlier warrant called for only 304 Long Land muskets, with 916 carbines of sorts, 95 pairs of carbine-bore pistols and 1324 pairs of pistol-bore 12" pistols.[126] Then followed warrants for 8000 Long Land and 12,000 short Land barrels, with 1000 carbine barrels, and for 20,000 musket locks and 500 pairs of pistol locks.[127] The decision about not naming or dating locks was repeated in the orders for the 21,0000 locks. The April warrants to the Wallers and Hirst called for 15,000 muskets of sorts, (i.e., long and short and perhaps Marine or Militia) and 696 carbines, as well as (in Hirst's case) the 304 muskets of February.[128] It all added up to a new flurry of production with the emphasis on the 42-inch barrelled Land musket. Production on these warrants suggests that some hesitation occurred somewhere along the production line, though where is not clear. The Wallers produced 7294 rough stocked muskets, 893 carbines and 23 with flat locks, 1324 pairs of Sea Service pistols and 95 pairs of Land Service with flat locks; Hirst set up 5621 Land muskets, 557 steel rammered Militia muskets, 500 Sea Service muskets, 772 carbines and 3 for Gentleman Cadets, along with 250 pair of Sea Service pistols.[129]

Seventeen sixty-seven was, like its predecessor, a year of stockpiling as well as production. Warrants to the Birmingham components contractors were not issued until July, and they called for 6000 Long Land barrels, 14,000 short Land barrels, 600 carbine and 2000 pairs of pistol barrels, along with 6000 Land musket, 4000 Sea Service musket and 2000 pairs of pistol locks.[130] The emphasis within the total annual production of 20,000 musket barrels shifted notably further towards the shorter barrel. William Grice and William Sharp (who also supplied

smallwork and was engraver to the Board) each received warrants for 5000 steel rammers, and it was at this time that the Board named Grice as the person responsible for the innovation of tempering steel rammers, although they do not say when he introduced this operation.[131] The scale of the new production was such that the Board managed to negotiate a new set of prices for locks. Beginning with the 10 July warrants the conventional round double-bridle musket lock was to cost 6/-,. the carbine lock of the same style 5/9, the flat Sea Service musket lock was to cost 4/2, while the round double-bridle Land pistol locks were to be 11/- the pair, and Sea Service pistol locks 6/- the pair.[132] The Wallers received a warrant to rough stock only 4000 muskets, and Hirst was to set up only 220 carbines and 500 pairs of Sea Service psitols, strongly suggesting (with the large production of components) that some decisions were being taken with regard to a new pattern of arm.[133]

In April, 1767, a new carbine was ordered made for the First and Second Troops of Horse Grenadier Guards to replace worn out arms; these are described as having barrels 'of 3 feet 6 inches length... with Bayonets and Steel Rammers' and as such constitute a new and distinct pattern of arm, probably becoming the prototype for the Heavy Dragoon carbine of 1770 which had the same characteristics. Two hundred and fifty-six of them were issued in June, and it was then noted that the ammunition for the old arms did not fit the new ones, confirming that they had previously carried the Short Land Musket with Wood Rammer for Dragoons.[134] Other carbines were also produced this year, and most exceptionally they are specified by types: the Wallers rough stocked 257 Horse Grenadier Guards carbines, 50 Artillery Officer's fuzees and 2 Gentleman Cadet's, and Hirst set up the HGG and officer's carbines as well as 108 Artillery, 23 with flat locks, 43 Light Dragoon, 35 Cavalry, and 11 Eliott Light Dragoon.[135]

Production for 1767 was considerably. up on the

previous year. The Wallers rough stocked 12,110 Land muskets in addition to the above-mentioned carbines, and Hirst set up 5178 Land muskets (probably Long Land), 7922 steel rammered Militia muskets, and 500 pairs of Sea Service pistols as well as the previously listed carbines.[136]

From what took place in 1768, it is clear that a number of key decisions had been taken regarding a new arm for the infantry during 1767. The major re-alignment in the proportions of the two lengths of musket barrels ordered in 1766 and 1767 suggests that a change was being seriously considered. On 26 January 1768 the Board ordered that patterns of all the various types of small arms then produced be sent to the Adjutant General of the army, at the desire of the Master General.[137] Less than a month later trials were scheduled to take place at Woolwich of various lengths of musket barrel, which were attended by Adjutant General William Hervey, General Williamson of the Royal Artillery and Thomas Hartwell.[138] Early in May the Board received a return of Long Land musket barrels then ready in the hands of the Birmingham contractors, a total of 4572, and ordered that these, and no more, be received into store.[139] On 6 June it was noted that 'His Majesty having approved of an Alteration of the Pattern of Small Arms, and fixed upon a certain Number to be kept in Store,' and the following day warrants were issued for a total of 34,746 Short Land musket barrels and 16,522 double-bridle musket locks, and a month later 'An Abstract of the Number of Steel Rammers, Heelplates, Handles and other particulars that will be wanting for making up 40,000 Short Land Service Musquets of the New Pattern approved by the King' was ordered by the Surveyor General.[140] The Rubicon had been crossed, and henceforth (in due course!) the British line infantry would be armed with a shorter, lighter and handier musket. A Royal Warrant confirming the decision was issued to the Master General the Marquis of Granby on 11 June 1768:

George R.

Whereas it hath been represented to Us that the

> Land Service Musquets now made use of by Our several Regiments of Foot are too long and heavy, and that Musquets of another Sort would be more convenient, a Pattern of which hath been presented to Us for Our Royal Approbation; We do hereby approve of the said Pattern Musquet, and our Will and Pleasure is that for the future all the Musquets for Our several Regiments of Foot be made agreeable to the said Pattern, Vizt: Three feet Six Inches long in the Barrel, and weighing Ten Pounds and a half at a Medium. And Our further Will and Pleasure is, that you cause the number to be kept in Store to be made up [to] One hundred Thousand, and that the said Number be esteemed the proper State to be kept in Our Magazines. But it is Our Express Command that none of the said New Pattern Arms be issued till after all those of the Pattern now in use have been delivered out of Our Magazines,...[141]

Of particular interest in the wording of this instruction are the doubling of the number of Land muskets to be kept in store over the specification of 1757, and the admonition not to issue any of the new arms until all of the old, Long Land Pattern, had been served out. The unexpected advent of the American Rebellion upset these calculations, and accelerated both the production of the Short Land Musket and the withdrawal of the Long, the latter mostly through exchange before leaving Britain. Note also in the Warrant that the 'several Regiments of Foot' are specified as the recipients of the new muskets: the Long Land musket remained in the hands of the Guards regiments (with the exception of some of the Guards Brigade serving in North America from 1780) until the 1790s.

In line with simplifying the identification of the principal patterns of muskets through the use of date designations, there is little difficulty is assigning the term 'Pattern 1768' to the Short Land musket now adopted for general issue throughout the British infantry. Everything associated with its production, except the locks, rammers and smallwork, was described as of the 'New Pattern' but too few examples of this early production have been positively identified to determine how many real

alterations were made to the design of the component parts. Superficial comparison with the Long Land musket of the time shows no external changes to the barrel (save for its length of 42-inches) or to the several items of brass furniture, except the buttplate, which is given a shorter, three-stepped, tapering tang, secured by the usual pin through the stock, nor to the lines and decoration of the stock. Until and unless further evidence is forthcoming, the Pattern 1768 musket must be considered as a short version of the Pattern 1756 arm in all of its components, except as noted. The first order for the new pattern brass furniture was given out on 6 July 1768, calling for 30,600 sets. Production during the following years produced no further orders for furniture until 1774, suggesting that the materials already in hand were sufficient and of the same pattern, and that available long-tang and Marine or Militia buttplates may well have been altered.

In August the Admiralty reported that the arms of the Marines stationed at their main depots of Chatham, Portsmouth and Plymouth were worn out, and requested that the replacement arms be fitted with steel rammers. This amounted to a total issue of 3710 arms, and the Board ordered that, upon receiving the old arms into store, the new ones would be issued. The year 1768 therefore saw the equipment of a major portion of the Marine force with steel rammered 42-inch muskets for the first time, well in advance of the line infantry.[142]

Production of complete arms during 1768 increased considerably over that of 1767, although not yet in connexion with the Pattern 1768 musket. The Wallers produced 7773 Land muskets, 3295 of them steel rammered Short Land muskets, and 10,709 steel rammered Militia muskets, along with 50 carbines and 3 for Gentleman Cadets. Hirst set up 3439 Land muskets of which 1000 were steel rammered Short Land, and 11,709 steel rammered Militia muskets, and 50 Eliott carbines.[143]

On 17 February 1769 Richard Waller, who had supplied the overwhelming majority of walnut stocks and rough

stocking operations to the Ordnance since 1718, died. His son James had been in partnership with him since early 1755, and had run the business since 1767. On 10 February Joseph Loder, who had worked for the Board very briefly in 1756, was admitted Gun Stock Maker to the Office in place of the retired and, a week later, deceased elder Waller, and from this time onwards the two firms shared out the rough stocking between them.[144] Another new contractor, Jane Mayor, widow of Thomas Mayor who had supplied brasswork to the Board since 1761, took over her husband's business and was warranted Brassfounder for Small Arms by the Board on 20 April 1768.[145]

Another new carbine, once again related to the new perception of greater mobility of the army, was warranted on 6 March 1769, for Serjeants of Grenadier companies.[146] This idea had originated among the provisions of the Cloathing Warrant of 19 December 1768, but it was not until January, 1770, that the exact pattern for this new type was approved, and an immediate order given for the production of the first 119 examples.[147] The distinguishing feature of this carbine is its carbine-bore 39-inch barrel, the only weapon used by the British army to have this barrel length prior to the adoption of the India Pattern musket in 1797. The brass furniture was also distinctive, only the trigger guard and rammer pipes being straightforward reduced scale versions of the current Land Pattern mounts. The long-tang buttplate was similar to, but differently stepped than the Long Land Pattern. The sideplate was the flat-surfaced S-shaped pattern adopted for the Light Dragoon pistol, and the thumb piece was a plain oval. The nosecap on the one identified example is of sheet rather than cast brass, but this may be a contemporary repair. In October, 1770, a Royal Warrant was granted, extending the issue of Serjeants Carbines to the serjeants of the battalion companies of the three fusilier regiments (7th, 21st and 23rd Foot).[148]

Towards the end of the year diplomatic tension began mounting against Spain over the ownership of the Falkland

Islands, and warrants were issued for the production of 1000 Bright and 2000 Black Sea Service muskets.[149] Production during 1769 concentrated on the Pattern 1768 musket, with a large proportion of the components having been delivered into store during 1768. Joseph Loder and James Waller between them rough stocked 20,000 of these new arms and 168 wooden rammered short muskets for dragoons; Hirst set up 17,000 of the new muskets, as well as 824 pairs of Sea Service pistols and 95 pairs of pistols with 10-inch carbine-bore barrels.[150]

At the end of 1769 the supply of Short Land Muskets with Wood Rammers for Dragoons ran out; the Board were unable to meet a demand from the 14th Dragoons and in January, 1770, the regiment was told to wait until the pattern for a new dragoon carbine was approved.[151] This occurred early in March, after the Adjutant General, Harvey, had decided to accept the 42-inch barrelled carbine made for the two troops of Horse Grenadier Guards in 1767 as a pattern for all regiments of Dragoons and Dragoon Guards; however, the Royal Warrant establishing the new arm was not issued until 15 March 1771.[152] No sooner had the Board been notified of this decision, than it warranted Waller and Hirst to rough stock and set up 168 of the old pattern muskets, thinking perhaps that it might be some time before the components for the new carbines could be prepared, while those for the muskets were readily available.[153]

The two remaining regiments of Light Dragoons, the 15th and 16th (Eliott's and the Queen's) were also in need of new arms, and although warrants were issued for complete new sets of arms for each regiment, the design of the current Eliott carbine was also under review, and it was several years before they received entirely new arms.[154] The focus of the new pattern was to be the substitution of a steel for the current wooden rammers of the first-production carbines; the first proposal involved fixing the rammer-retaining spring in the wood of the fore-end rather than rivetting within the tailpipe, but

Hartwell reported against this early in March, saying it would entail extra work and materials, and represent no improvement over the tailpipe method. He was ordered to attend the Board with an example of either Eliott's or Burgoyne's (the old Royal Forresters) carbines.[155] By the end of the month Hartwell reported that sufficient cut-off steel rammers were available along with springs and tailpipes, and the Board ordered Eliott and Burgoyne to be informed that these components could be collected by delivered to a 'proper Person to receive them' whenever they pleased.[156] Unfortunately, by the end of May it was reported that the available rammers were of too small a diameter to fit the carbines correctly, and it appears that this attempted conversion scheme foundered. Here the question of new light dragoon carbines rested until 1772.

Early in March the Board informed the Birmingham contractors that there would be no warrants for locks and barrels during 1770. The contractors replied by requesting the Board to take their dead stock off their hands, as they were in a bad way for work, having to pay ready mo ney and borrow at high interest rates. The Board does not appear to have responded to this request, but in December it did order 1000 carbine barrels and 500 Sea Service musket locks.[157]

Despite the absence of work for the Birmingham contractors, there was considerable activity. Hirst was given 11,000 musket barrels to cut off, new loop and sight, and warrants for setting up the Pattern 1768 musket totalling 7095. Waller and Loder were each to rough stock 2000 Long Land muskets, with Waller providing another 4000 Pattern 1768 muskets and 1500 Sea Service muskets.[158]

Early in May the Board ordered a carbine-bore pistol and an example of the pistol of the First Troop of Horse Guards to be brought to them, and a week later decided that the First Troop of Life Guards were to have a new set of pistols on a pattern of Lord de la Warr's, which would be inspected by Major D'Auvergne. It is not clear from the records whether any action was taken on this decision.[159]

In October, Thomas Blakemore of Darlaston, Staffs., replaced the late George Haskins as a Gun Lock Maker to the Board.[160] Blakemore was to be a prolific supplier of locks during the period of the American War. Another gunlock maker who would ultimately achieve considerable renown made his first appearance in the Ordnance records in November, 1770: Henry Nock (rendered, as so often, Knock), submitted a peculiar design of lock which was rejected by the examiners. The description given is not sufficient for it to be taken as a possible first attempt at his later-famous screwless-lock.[161]

Production during 1770 amounted to 4000 Pattern 1768 muskets, 4502 Sea Service muskets, and 319 carbines rough stocked by Waller and Loder, of which 119 were the new Serjeant of Grenadier carbine done by Loder. Hirst produced 6095 Pattern 1768 muskets and 168 wooden rammered Short Land for Dragoons, as well as 4500 Sea Service muskets and 319 carbines (including 119 Serjeant of Grenadier's).[162]

On 4 January 1771 a Royal Warrant was issued for the establishing and arming of one company of light infantry for each of the existing forty-four regiments on the British Establishment. Although this particular warrant was cancelled on 5 March, the concept was carried into effect, and a Light Infantry carbine & bayonet with a 42-inch barrel was introduced for these companies, the serjeants of which were to carry the new Serjeant's Carbine.[163] It used conventional Land Pattern furniture and was more robustly stocked than its predecessor, the Artillery & Highlander's carbine of the 1750s. Because it includes no variant forms of component it is generally not differentiated in the production records, and its manufacture is assumed to be included within those large groups of unspecified carbines with bayonets and 42-inch barrels. It is identical in appearance to the Heavy Dragoon carbine just coming into production, except that conventional sling swivels were used rather than a sling bar.[164]

At the beginning of 1771 the tension over the ownership of the Falkland Islands looked like ending in a war with Spain, and production of Sea Service muskets took priority. Warrants were issued for 3000 to be rough stocked and set up, but almost immediately a crisis arose over a lack of locks. In February 861 old pattern [pre-1756] round [Land service] repaired locks were issued for use in completing the Sea Service muskets, since they could not any longer be used on Land Service muskets; in April it was reported that there were only 770 correct Sea Service locks available, but several thousand of the new pattern round Land Service locks, to complete 1500 of the arms; it was ordered that the round lock be used.[165] At the time of writing none of this small group of emergency Sea Service muskets, using old and new Land Service locks, has been identified. Later in the year warrants for 6500 more rough stocked Sea Service muskets were issued.[166]

The next most pressing problem facing the Ordnance in the new year was that of a new carbine for dragoons. Warrants were issued to Waller and Hirst for another 200 of the old wooden rammered muskets in mid-February, and at the end of the month the Board ordered that despite the warrants of 5 Oct. 1770, 4 January and 8 February 1771, 'the said arms be not yet set up as it is not determined whether they should have Wood or Steel Rammers.'[167] However, 520 of the old muskets had already been rough stocked and 270 of these set up; the guns could not be altered for steel rammers in the rough stocked stage, and further work was halted.[168] By mid-May 1000 barrels for dragoon carbines were reported completed, all that was wanting was the flat sideplates to set them up, and these were ultimately set up by Hirst before the end of the year.[169] However, in December, the 4th Dragoons were still being sent the old wooden rammered Short Land muskets as replacement arms.[170]

Although no warrant for its establishment has been located in the records, a new pattern of Artillery carbine seems to have come into use at this time. The only feature

which distinguishes it from other Land Pattern carbines is that the barrel is 37 inches in length and is fitted for a bayonet. This represents a shortening of the barrel from infantry length to cavalry length, and given the very secondary role played by small arms in the Artillery, this does not seem unreasonable. They were initially made with wooden rammers, but all those in store by November, 1775, were ordered converted to steel ones, and all made subsequently were fitted with the steel rammer. [171]

Small arms produced during 1771 included 4000 Pattern 1768 muskets, 3000 Long Land muskets, 520 Short Land for Dragoon muskets, 6000 Sea Service muskets, 1300 Artillery carbines, 1000 Dragoon carbines and 30 unspecified carbines rough stocked by Waller and Loder. Of these Hirst set up 1000 of the Pattern 1768 muskets, all of the Long Land and Sea Service muskets, 270 of the Short Land for Dragoon muskets, and all of the carbines.[172] Although it is only conjecture, the impression is that the Board was feeling pinched for money, and was completing only such projects as were being forcefully put forward. The build up of the stores to a level of 100,000 Pattern 1768 muskets laid down in the establishment warrant was proceeding at a very leisurely pace despite most of the components having been delivered in within a year of the first warrants being issued, and the re-equipment of both the Heavy and Light Dragoons was moving equally slowly.

While at least some carbines for the Heavy Dragoons had finally been produced, nothing had yet been resolved regarding a carbine for the Light Dragoons.It was a subject which created a lot of interest in army circles. The arms of the 15th had finally worn out, and may have suffered additionally in being converted from wooden to steel rammers; a warrant was issued on 10 January 1772.for a complete new set of 174 carbines. It was noted that the regiment 'was a first armed of a particular pattern with Wood Rammers, which have since been fitted with Steel Rammers and there being none in Store of that Pattern' warrants were requested for barrels and brasswork; this

request was postponed, but further steps were to be taken.[173] In February Adjutant General Harvey, who seems to have had a personal interest in small arms, wrote to a fellow officer in Ireland:

> Our two regiments of Light Dragoons on this Establishment [i.e. the British] have different carbines. It is proposed, as new are to be made, for the future they are to be made exactly of one pattern, certainly right, much more so if those of the British and Irish establishments were also to be conformable. I believe those of the three Irish regiments are not according to one pattern ... I am to desire of you to mention it to the Lord Lieutenant that one of each species of the carbines of the Light Dragoons shall be sent to England.[174]

During May William Grice was ordered to supply 400 steel rods for carbines, and long forepipes for carbines with steel rammers and springs for carbine tailpipes were also ordered. The following month the new Master Furbisher, William King, who replaced the recently deceased Thomas Hatcher, and John Johnson, Clerk to the Surveyor General, reported to the Board on a new design of carbine 'as proposed for the several Regiments of Light Dragoons' which report was accepted, and the Board ordered that production of the new carbine proceed.[175] In August, General Harvey gives us a glimpse of what was preferred by those in command of the units concerned:

> Lieutenant General Elliot and Major-General Burgoyne examined the carbine which was made; recommended to have bolts instead of pins, to fasten the barrel to the stock, but that the pins are continued in the pattern, that the middle pipe is made only 1½ inches long instead of 2½. One particular they desire me to mention-that the brass of the guard may be made quite smooth like that of the tailpipe. They much wish for a rifled barrel carbine to be made, as a pattern, as they apprehend it may be well worth considering if rifled barrels for the Light Dragoons will not be particularly useful for H M's service.[176]

From the pattern which eventually emerged, it is evident that the wishes of Eliott and Burgoyne were ignored, most likely in the interests of economy as regards both

brasswork and rifling, but the Lieutenant Colonel of Burgoyne's regiment took it upon himself to provide a small number of rifled carbines for his troops before they went to North America in 1776 (see below, page 210). That, so far as the records indicate, was the end of movement towards a new Light Dragoon carbine for another year.

Apart from the appointment of a new Master Furbisher (who was to have but a short tenure, dying in 1780), John Johnson died in 1772 and was replaced as Clerk to the Surveyor General by Miles Edward Wilks, with King's vacated position of First Viewer at the Tower being filled by Richard How, a London gunmaker who had been a contractor to the Board in 1756-7, and who was to die in 1775.[177]

Small arms production for 1772 was the lowest of the inter-war period. Waller and Loder delivered in none of the Pattern 1768 muskets, 2000 Long Land muskets, and 2000 Sea Service muskets in the rough stocked state, while Hirst set up 4000 Pattern 1768 muskets, and filed fit for stocking 5100 of the new musket barrels.[178]

Early in 1773 the Daymen employed in the Tower by the Small Gun Office were ordered to alter the carbines of the Second Troop of Horse Guards (which had been issued in 1767) by fitting a long trumpet forepipe.[179] In May Hirst received 8000 musket barrels to be cut off, new looped and sighted, as well as 5993 new musket barrels to be filed fit for stocking.[180] In early June it was ordered that the Gentleman Cadets of the Woolwich Academy were to have a complete new set of arms, fitted with steel rammers, and these 48 carbines were completed by Hirst before the end of the year.[181] On 15 June the Board ordered that the new arms for General Eliott's regiment of Light Dragoons be prepared in accordance with the pattern approved by the King, and that Hirst make up a pattern carbine for the Adjutant General.[182] Less than a month later a Major Dundas requested to make an alteration in the pattern 'preparing for the King's Regiment of Light Dragoons' and

the Master Furbisher was ordered to bring the pattern before the Board.[183] It is tempting to identify this change as the grooved rammer and notched nosecap which was to become the characteristic feature of the new Eliott carbine, but there is no supporting evidence on the details of the importunate major's last-minute change, nor even whether it was adopted.

Production of the Heavy Dragoon carbine was still lagging well behind requirements. Requisitions from the 6th and 11th Dragoons each calling for 360 carbines with steel rammers could not be met, as there were only 112 in store, and orders were given for 500 additional barrels and accompanying brasswork.[184] The way this order was written seems to suggest that the carbines were being produced almost on a regiment by regiment demand basis.

In November Joseph Grice, nephew of the late Joseph Grice who had been a contractor for barrels since 1762, wrote the Board for permission to succeed his uncle in this position, which was approved.[185]

In the course of 1773 Waller and Loder rough stocked 6000 Pattern 1768 muskets, 3104 Long Land muskets, 2000 Sea Service muskets, 48 Gentleman Cadet's carbines, 174 Heavy Dragoon carbines, 12 Eliott carbines (probably as patterns), and 3 'Blues' carbines; Loder also rough stocked 250 unspecified carbines. Hirst set up 2000 Long Land muskets, 2000 Sea Service muskets, and all of the Dragoon and Cadet carbines. There is no mention of the Eliott carbines at this stage of production.[186]

A state of the serviceable arms in store at the Tower in the Spring of 1774 shows only 6000 of the new Pattern 1768 muskets, and 2000 Sea Service muskets, both in the rough stocked state only. There were also 14,222 Short Land barrels and 18,133 locks, of which only 7648 were new production, the remainder being repaired.[187] The Warrant Books make it clear that new production arms were being issued to the regiments almost as fast as they could be made.

In April John Hirst was joined by his son James as a

partner in the setting up operations for the Board.[188] Shortly afterwards the new partnership was given its first warrant, to set up 25 carbines for the 'Blues.'[189] In May the warrants for the year's production were issued; 500 carbine locks were to be made by the Birmingham contractors, while 4000 Militia muskets were to be rough stocked, 2000 of which were to be set up.[190] In July Jane Mayor received her first warrant for Land musket furniture since that of 6 July 1768, amounting to various quantities to make up 10,000 sets. No deliveries of any sort of furniture are recorded from 1768 until September, 1773, and until this July, 1774, delivery, all had been for small amounts of carbine furniture. This suggests that furniture taken from older broken-up arms was much utilised during the introduction period of several new patterns of arm.[191] The new carbines for the dragoons were not only in short supply, but those issued were not giving satisfaction. Two regiments in particular complained that while the old arms were fitted with trigger plates the new ones were not, and that they also lacked rammer stops, and had green wood in the stocks; the rods were not threaded for a worm, and the lock screws were poor quality.[192] Regrettably no response from the Board has survived. Generally army complaints were found to be based on the ignorance or mismanagement of the soldiers, but these complaints over quality suggest a higher level of dissatisfaction than was normally the case. It would appear that some regimental officers were taking the guidance offered by Bennett Cuthbertson, based on the Cloathing Warrant of 1768, seriously, and inspecting the arms issued to them in a professional manner.[193]

On 19 October 1774 an Order in Council prohibited for the following six months the exportation of gunpowder, ammunition, small arms and warlike stores to the North American colonies.[194] This prohibition was to be renewed half-yearly until 1783. It is the first indication in the Ordnance records of the trouble brewing across the

Atlantic, and indeed the Minutes of the Board for the second half of 1774 are devoid of anything noteworthy concerning the production of small arms.

Production during this final year of peace remained low. Waller and Loder rough stocked 4000 Militia muskets, 1000 Dragoon carbines, 200 Serjeant's carbines, 25 'Blues' carbines, and 250 unspecified (probably Light Infantry) carbines. Hirst set up 2000 Militia muskets, 3104 Long Land muskets, and all of the carbines, although the total of unspecified carbines he set up amounted to 500.[195]

While the inter-war years after the War of the Austrian Succession had been occupied largely with repair and conversion work by the workforce of the Small Gun Office, and had seen virtually no new production of small arms, the years between the close of the Seven Years' War and the outbreak of the American Rebellion were busy ones for both the Ordnance workers and the contractors. Apart from bringing up the stores to agreed levels, these years saw. the approval and production of at least six new patterns of small arms (Short Land musket for infantry, Light Infantry, Heavy Dragoon, new Eliott, Serjeant's, Gentleman Cadet's, and Artillery carbines). During this eleven year period production had totaled 111,911 barrels, 103,794 locks, and 121,304 rough stocked arms. Of the latter there were set up twenty-one different types of arms as complete weapons. These included 29,095 Pattern 1768 muskets, 26,309 Long Land muskets, 25,968 Militia muskets with steel rammers, 11 Marine muskets with wood rammers, (4900 Land muskets with barrel length not specified), 638 Short Land muskets with wooden rammers for Dragoons, 14,107 Sea Service muskets, 50 musketoons, and ten types of carbine:

Artillery	1408
Artillery, Officer's fuzee	87
Artillery, Gentleman Cadet's	51
'Blues'	319
Cavalry	35
Dragoon's	2174

Eliott's Light Dragoon	61
Light Dragoon	43
Serjeant of Grenadiers	319
with bayonet, unspecified	1833
unspecified	1250

Pistol production totalled 2249½ pairs, which included 1577½ Sea Service, 13 pairs of dragoon pistols with 12-inch barrels, 50 pairs of 'Blues' pistols with 10-inch carbine-bore barrels, 54 pairs of Light Dragoon pistols with 9-inch barrels, 152 pairs with flat locks (Royal Forrester's) for the 16th Light Dragoons, and 358 pairs unspecified.[196]

Unlike the period immediately preceding the outbreak of the Seven Years' War, there are no surviving returns for the state of arms in store in 1775. But there is no doubt from what information does survive that the Board moved much more quickly to get into full production, and met with much less success in doing so than had been the case during the opening period of the previous conflict.

* * * * * *

The first four months of 1775 were filled with activity on the part of both Board and contractors. Warrants were issued to the Hirsts in January for setting up 4000 Militia and 2000 Short Land muskets, and the following month Waller and Loder were each to rough stock 3000 muskets, while William Grice was to repair 4000 musket locks. One hundred carbines were to be fitted with steel rammers. In March 200 Marine muskets with steel rammers were ordered to Portsmouth, and all those with wooden rammers in store at Portsmouth were to be sent to the Tower as quickly as possible; John York, who had been appointed Viewer of Small Arms at Birmingham in the room of the deceased John Stewart, was sent north to view 9093 barrels and 4117 locks then waiting in the hands of the contractors. On the basis of York's report, a further 4700 barrels and 4367 locks were warranted in April.[197]

The names of the contractors with whom the Board commenced the present wartime production programme included James Waller and Joseph Loder as rough stockers, John & James Hirst as setters up, with Jane Mayor supplying brasswork. The Birmingham barrel makers included Samuel Galton & Son, Barker & Harris, Benjamin Willet junior, Joseph Oughton and John Whately; those supplying locks were Thomas Blakemore, Henry Nock, William Grice & Son, and Galton & Son;tothe chagrin of all the standing contractors, this list was to be much expanded in the course of the war.[198]

By mid-year further contracts were let; in late June Waller and Loder were ordered each to rough stock 2000 Marine or Militia muskets, and Hirst was given 4000 musket barrels to cut, new loop and sight.[199] In July, having received a state of the old and new pattern muskets with wood and steel rammers then in store (which most unfortunately does not survive), the Board ordered 'that the long and short Land Musquets with wood Rammers be altered to steel Rammers.[200] That this order was not entirely carried out will appear in due course.This same report also informed the Board that there were rough stocked muskets, either in store or in the hands of the stockmakers, amounting to 6000 Pattern 1768, 6000 Militia and 2000 Sea Service, and these were ordered set up 'forthwith,' and that a further 26,000 barrels and 20,000 locks be ordered. The following month another 3000 barrels and locks were ordered to replace those which had been sent (as complete muskets) to Quebec.[201]

On 25 July a major decision was taken with regard to the design of the brass furniture for Land muskets: it was ordered that for the future the furniture for the Land and Militia muskets was to be of the same pattern, with the flat sideplate of the latter and the pin-held tang and thumbpiece of the former being adopted as the standard. On the same day Jane Mayor received a warrant for making up the numbers of brass Land furniture to 15,000, all of which were paid for by December. By the same order, new

pattern bayonet scabbards were ordered 'as the old Pattern Bayonets are now totally out of use for short Land and Militia Musquets.'[202] The last order placed for distinctive Marine or Militia furniture was dated 31 January 1775, and consisted only of 4000 buttplates and 2000 nosecaps, and was paid for by May of that year.[203]

The Birmingham lockmakers were the cause of the Board's greatest worry during the present production period. On 12 September Messrs Galton & Son, Grice & Son, Blakemore, Edge, and Willett wrote that

> at the time they received the Board's orders for supplying Locks, the workmen were fully employed for the East India Company at a higher price than they can afford to give, and therefore refused to work for the Office unless at an advance of 1/- each, which they refused to comply with in hopes that they would work at the usual price, but as the workmen still persist notwithstanding every effort to suppress, they therefore requested the Board's directions herein.

The Board obviously smelled a combination against them, and replied that there would be no increase in price and that they expected the orders to be complied with.[204] The lockmakers replied to the Board on 9 December, saying that they could not proceed with the work, since new contractors and the East India Company were keeping the workmen busy, and that only a certain number of the workforce were capable of making Tower locks. They were again informed by the Board that there would be no increase in the prices allowed.[205] Judging from the manner in which those contractors who supplied both barrels and locks were able to complete their barrel work, it is very likely that there was a genuine difficulty with the lockmaking workforce, and that this was not a deliberate ploy on the part of the contractors to raise the price. More encouraging news came from the chief barrel suppliers, Whately and Oughton, who informed the Board in October that they had completed their current warrants and said they could each supply 1000 locks and 2500 barrels by the end of the year; the Board gave each of them

warrants for 1000 of each.[206] Early in November the Board ordered all Artillery carbines then in store with wooden rammers to be immediately converted to steel rammers.[207]

Small arms production in 1775 was small, amounting only to 3000 Land muskets and 2000 Militia muskets rough stocked by Loder, and 4900 Short Land muskets and 5100 Militia muskets set up by Hirst.[208]

Due to all of the varied and momentous events in world history consequent upon the success of the American rebels in establishing their independence after a struggle of eight years, a very distorted and exaggerated view of that struggle has been promulgated and elaborated over the years since 1783, which often makes it difficult to gain a clear perspective and balanced view of the events as they were seen at the time. To the British government of the day, and to most of the literate classes, the opening years were seen simply as a colonial rebellion, and as one which was not serious in its extent, although potentially injurious to trade if allowed to go unsuppressed for too long. There were no doubts in most informed people's minds that the existing military and naval resources could cope with the situation, and although the rebel's persistence surprised some, it was not until the imminent entry of the traditional enemy across the Channel became apparent by late 1777, that anyone in a decision-making position became seriously concerned. It is against this background of relative unconcern and confidence that the supply of small arms by the Ordnance prior to 1778 must be viewed.[209]

While there was no actual feeling of panic within the Board, the drain of small arms to the many regiments being sent to North America had to be replaced to maintain the settled establishment of arms in store, and to this end greater production than had been achieved in 1775 was clearly necessary. It is perhaps indicative of the sense of general well-being, that the first task tackled by the Board in the new year was the relatively minor one of a supply of rifles for the troops serving in America. The

Master General had sent a messenger with two rifles to Captain Tovey at Woolwich on Boxing Day of the previous year, and on New Year's Eve had written ~~written~~ to Lord George Germain asking him to obtain the King's orders for 1000 'rifled barrelled pieces', explaining that

> The Highlanders who have many marksmen and Deerkillers amongst them are particularly desirous of having five of these pieces p Company. I am persuaded they would be of great use in America. Colonel Harcourt [of the 16th Light Dragoons] desires also the same proportion, & I would submit whether every Batalion engaged in this Service should be provided with this, much boasted weapon, of that Country.[210]

On 15 January 1776 Germain replied to Townshend's letter giving the requested permission to order the rifles 'to be distributed among the different Corps as proposed by Your Lordship.'[211] Townshend had already been in contact with Colonel William Faucett, who was then in Germany inspecting the troops gathering there to be sent to America, and only four days after receiving Germain's letter he noted that part of the rifles were already ordered, with the balance to be ordered as soon as possible.[212] Two hundred rifles were being manufactured in Hanover by Heinrich Huhnstock, to be sent to England in batches of fifty at a time as quickly as possible, but for reasons which do not appear in the records, the balance were to be made in England.[213] At the end of the month the Board ordered that the Viewer at Birmingham give directions to those barrel and lockmakers 'as can give most despatch & be relied upon' to provide '600 Rifled Barrel Guns according to a Pattern sent to Mr. Grice who had ingaged for 200 Exclusive of the above 600' and to inform the Board as to price and delivery time.[214] On 12 March the Master General wrote to General Howe at Boston, informing him that a quantity of rifles was then being made in Germany and Birmingham, whose distribution, with the exception of the Highlanders and General Burgoyne's regiment (the 16th Light Dragoons), would be left to his discretion.[215] In a second letter to Howe this discretionary distribution was confirmed, saying that

there had not yet been any distribution made, and adding that 'It is a nasty weapon but since the Enemy will teach us the use of them I shall send you the best I can produce both from Germany and here as soon as possible.'[216] The two hundred Hanoverian rifles arrived in London during June, and 800 Birmingham rifles, which were made in equal quantities by Grice & Son, Benjamin Willets, Matthias Barker and Galton & Son, were delivered in two batches in September, and by the end of December, at a cost to the Ordnance of three guineas each.[217] In June it was decided to experiment with the breech loading rifle designed and ably demonstrated by Captain Patrick Ferguson of the 70th Regiment, and it was ordered that one hundred of these be made at Birmingham, with the manufacture being supervised by Ferguson; these one hundred rifles were made by the same four contractors who were making the muzzle loading rifles, and although the June order was intended to stop any further production of the earlier rifles, all of these as well as the Ferguson rifles were completed and paid for at the end of December.[218] Ferguson's rifles had a very short service life, being utilized by his specially trained force of one hundred riflemen between the time of their arrival in America on 26 May 1777, and 12 September, the day after Ferguson was wounded in the arm during the Battle of Brandywine, at which time Howe returned the men to their parent regiments and put the rifles into Ordnance store on his arrival in Philadelphia.[219] There is almost no evidence as to the ultimate distribution of the muzzle loading rifles, beyond references to fifty of them each being sent to the armies commanded by Burgoyne in Canada and Howe at New York.[220] They were probably issued peacemeal to marksmen in the serving regiments, and there were a number of rifle companies in the British forces which probably made use of them.[221]

Activity in other, more basic, areas of production began early in the year. At the end of January Jane Mayor reported that she had completed all outstanding orders for brasswork and requested more, and on the same day

gunmakers William Wilson and William Holden asked to supply locks and barrels. Holden had previously offered to supply 3-400 locks and 800 barrels per month, and at the end of January he was given his first warrant, for 600 of each to be supplied within two months; Mrs. Mayor was given orders for 650 sets of Artillery and 318 sets of Eliott carbine furniture, and the Hirsts were warranted to set up 3000 Pattern 1768 muskets.[222] At the end of February the Master Furbisher and Modeller reported on a carbine which General Eliott had sent in, which incorporated the notched nosecap which became its distinctive feature along with the grooved rammer to fit it. It was suggested that the nosecap might be made of iron rather than brass to prevent rapid wear, but King and Hartwell thought this might be too expensive. They were ordered to determine the relative costs and report back.[223] It is worth noting that the order for Eliott carbine furniture given to Jane Mayor on 16 February and paid for on 16 March, included 318 brass nosecaps: of this pattern?

On the application of its commander, the First Troop of Horse Grenadier Guards were to be issued with pistols of the same pattern as those made for the Royal Forresters during the Seven Years' War; after some investigation this was approved by the Board. These had 10-inch carbine-bore barrels and flat locks, with the old-fashioned long-eared buttcaps. A warrant for 136 pairs of these pistols was issued on 14 May.[224]

In late March Waller and Loder were each issued warrants to produce 3000 Land muskets, but not until the middle of May were 2000 muskets ordered to Hirst for setting up, when another 1000 barrels were ordered from William Holden.[225] On 24 April the Board were informed that only 8554 locks had come in since June, 1775, and it was therefore decided to order 40,000 locks from Liège. A meeting with the lockmakers to be held at the Tower was scheduled for early May.[226] By mid-year production orders were beginning to increase, with Hirst being given 4000 muskets for setting up, and warrants to Waller and Loder

to each rough stock 4000 Pattern 1768 and 1000 Militia muskets. By the end of the year these had been increased by another 5500 for setting up.[227] By the end of October John Hirst, whose entreprenurial skills had immensely enhanced the manufacturing capacity of the Ordnance from the beginning of the Seven Years' War, and who had held a virtual monopoly of the Board's setting up contracts and contractor-based repair work since that time, was dead, and his son and partner James was confirmed by the Board as his successor in the business.[228] Whether the son lacked his father's skills and trade contacts, or whether the demands made were simply too large for one contractor to cope with is not clear, but whatever the cause James lost his monopoly of the setting up work by 1778, and had become relatively unimportant in the overall production programme by the end of the war.

Despite the continuing difficulties with the lockmakers over their deliveries, early in August letters were sent to Galton, Willets, Grice, Blakemore and Nock asking how quickly they could provide 1000 carbine locks 'without interfering with their present work.' Their reply of almost a month later stated that it would take about a month from the time of receiving the pattern. They also mentioned that they had lately supplied some extra-filed flat double-bridle carbine locks to which no price had been fixed, and were informed they would be allowed 8/- each for them.[229] In fact, apart from 529 supplied by the others at this time, Henry Nock seems to have had the monopoly of supplying these flat locks during the war, making all of those for pistols as well as the bulk of the carbine locks.[230]

Tompson Davis, who had been a smith in the Small Gun Office in 1774-5, offered in mid-August, 1776, to set up guns for the Board; far from the outright refusals which such offers had until now evoked, the Board informed him that when they needed more than Hirst could manage, he would have a share.[231] In December the Board finally accepted William Wilson's repeated offer to work for the

Board, and told him that if he could supply 500 muskets by 31 December, he will be so employed.[232] Wilson, who had been a partner in his father Richard's firm at the time of the combination against the Board at the outbreak of the Seven Years' War, had apparently inherited the Board's ill-will from this incident, but his extensive network of sub-contractors and stature within the Gunmaker's Company and the trade generally appears to have obliged the Board to accept his offer, and he became the first contractor to break the Hirst monopoly. By the end of 1776 it is clear that the Board was considering alternatives to the Hirst monopoly, perhaps in light of the elder partner's death, or with an eye to future, greatly enlarged, requirements.

Production during 1776 reflects Britain's increased military commitment in North America with its consequent drain upon the King's Stores. For most of the year brass furniture supply concentrated upon carbines, about 700 sets for the Eliott, 500 for the Artillery and 300 for the Serjeant of Grenadiers being delivered in, with 3000 sets for Sea Service muskets and 10,000 sets for Land muskets being turned in during the final months of the year. The distinctions between Long Land and Short Land (Pattern 1768) muskets are frequently blurred in the records of this period, but in general if the two are supplied together it is the Long Land which, as the lesser quantity, which is distinguished rather than the Short Land. Entries made as 'Land Muskets' have therefore been treated as Short Land in computing production figures. James Waller and Joseph Loder between them rough stocked 3000 Long Land and 20,922 Short Land Muskets during 1776, as well as 2000 Marine muskets, 588 Light Dragoon carbines, 300 Serjeant of Grenadiers carbines, 192 Artillery carbines and 192 unspecified carbines, probably for Light Infantry. In addition, Waller produced 342 pairs of carbine-bore pistols and Loder the other 68 pairs of Royal Forrester's pistols. In the final year of his monopoly, Hirst set up 6000 Long Land and 11,100 Short Land muskets, 6000 Militia muskets, 2000 Sea Service

muskets, 474 Light Dragoon carbines with flat locks, 384 Artillery carbines, 300 Serjeant of Grenadiers, 228 Royal Forresters, 136 pairs of Royal Forresters pistols, and 684 pairs of 9-inch barrelled carbine bore Light Dragoon pistols. William Wilson was not billed during 1776 for his 500 muskets.[233]

'The Year of the Hangman' opened with much activity in the accoutring of the Ferguson breech loading rifles, and with Hirst receiving a warrant to set up 2000 muskets, and Wilson a similar warrant for 200 more. Warrants were also issued to rough stock 2000 Bright and 4000 Black Sea Service muskets and 2000 pairs of Sea Service pistols, of which 2000 only of the Black Sea Service muskets were to be set up. The London gunmaker Michael Memory applied to work for the Board but was refused, but Thomas Tucker, a gunstock maker who told the Board he had plenty of well-seasoned walnut on hand, was not. He received a warrant to rough stock 2000 Short Land muskets, and the expansion of the Board's manufacturing base took another step forward.[234] In March, 1777, we are granted our only view in our period of at least a part of the workforce in the Small Gun Office. The proposed pay-scale submitted by the Surveyor General mentions:

1	Viewer at Birmingham	@ 4/- per day
1	Barrel Viewer	@ 3/- per day
2	Lock Viewers	@ 3/- per day
2	Gun Viewers	@ 3/- per day
10	Gunsmiths	@ 2/6 per day
24	Furbishers	@ 2/- per day
40		[235]

John Pratt, described as a gun lock maker, had been employed by the Office since at least 1771, and in April, 1777, he submitted to the Board a minor improvement in musket furniture which the Board approved of and ordered into use on all muskets being set up in future. This consisted simply of the second ramrod pipe being flared at its mouth, a slightly smaller amount than the upper trumpet pipe, which prevented the rammer missing the pipe

when pushed down its channel in a hurry, and in fitting a square brass plate at the base of the channel, inserted beneath the upper finial of the trigger guard.[236] It is unlikely that these improvements were incorporated in the only order for brass musket furniture given during 1777, on 13 May, when 10,000 sets were ordered; the new form of pipe is not mentioned in the orders until 22 January 1779, but it cannot be stated with certainty whether this is a vagary of bookkeeping or a reflection of the situation. There may have been ample numbers of the old second pipes on hand, and these would have been used up before a new one was introduced, although 1778 saw the production of 20,000 sets of Land musket furniture without this feature being mentioned. On the other hand, it was normal practice to mention a feature when it was new, and then to stop doing so after a period of time, and if this was followed in the present instance, then the introduction of 'Pratt's pipe' and the rammer stop would have to be dated to early 1779.[237]

Pratt, although still employed as a Lock Viewer in the Small Gun Office apparently had outside facilities at his command, (unless we are dealing with two separate people of the same name), and on 9 May 1777 he was granted his first warrant, to set up 1000 Short Land muskets, which was followed in early June by a warrant for a further 2000. At the same time Thomas Tucker was to rough stock 2000, along with Waller and Loder who each were to rough stock 2000, with Loder receiving also a warrant to rough stock 2000 Bright Sea Service muskets. Hirst and Wilson each received warrants to set up 2000 Short Land muskets, while a little later in the month Tompson Davies was warranted to set up 500 Short Land muskets.[238]

The troubles with the lockmakers were not yet over, although it appears some agreement must have been reached at the meeting on 8 May, 1776. Under that agreement Galton, Willetts, Grice, Blakemore and Nock had contracted to send in a total of 47,000 musket locks in the coming year, but by 25 June 1777 only 28,355 had been received.

However, there is no indication that any locks had actually been ordered from Liège.[239]

In late July the balance of the rough stocked Sea Service arms ordered in February were equally distributed amongst Hirst, Pratt and Wilson to be set up; the Hirst monopoly was finished. At the same time a new man appeard in the rough stocking trade, and this caused a most informative complaint from James Waller. Richard Trested was a gunstock maker who had worked for the elder Waller for seventeen years, and had now set up on his own, and offered to rough stock for the Board, which they accepted. A week later James Waller wrote the Board, and as the letter contains so much illuminating detail, it is quoted in full:

> Mr Waller his Father had served the Board more than 50 years without the interference of any other Person except about 8 years ago when Mr Loder was admitted & as one Person has since obtained Orders & two more applying which they apprehended would rather impede than further the Office Business [,] beg'd leave to observe that in the Year 1740 the then Master Genl desired Messrs Waller to make only for the Office which they punctually obeyed & that the men being very scarce Messrs Waller with profound secrecy great Trouble & expence did instruct and cause to be instructed 40 men and in the late War did in the space of 8 years Rough Stock upwards of 263,000 musqts Carbines and Pistols & repaired 18000 Stocks [,] and further represented that James Waller & Joseph Loder have provided 50,000 Land Musquets and 10,000 Pair of Pistols Stocked solely for the Office Service & as the increasing the number of Masters will make their property more precarious as well as the providing for the future as the walnutt from the Tree takes 2 years Seasoning for the Office Use [,] they were of opinion that without great precaution is taken Dry Wood will not be easily got in this Kingdom & therefore hoped the Board would give them such directions as should be thought proper whether to make any further provision of Stocks or to Stop.[240]

Given that there were only a limited number of capable workmen, and that the timber supply was also finite, some of Waller's pleading makes sense. Unfortunately, the Board

chose to call them in and discuss the problem verbally, and all that was recorded of their discussion was an instruction to the firm to get more wood in. It is a sad contrast with the loyalty shown to John Hirst in former years, and one would like to think that it was purely a question of the greatly increased demand which prompted the Board to act as it did. In August, Richard Trested received his first warrants, to rough stock 800 Land muskets, and before the end of the year he was also setting up arms, but he was not to become a large scale producer on a level with Thomas Tucker, about whom the Wallers had made no complaint.[241]

Having placated the rough stockers, the Board turned again to the problems facing the lockmakers. It was proposed by the lockmakers to try the sending of a Lock Viewer to reside at Birmingham, with additional viewers added to the staff at the Tower, and in future to issue orders for locks in the joint name of the standing contractors rather than separately. Although the last Lock Viewer sent to Birmingham had proved a failure and the idea had not been tried again until now, the Board agreed to the suggestions, and said they would establish a central warehouse in Birmingham where all the locks could be sent in for examination by the King's Viewer. They also asked the contractors how many locks per week they could send in.[242] The lockmakers 'highly approved' of the Board's plan (largely of their own devising), and said they could send in 900 to 1500 locks per week, amounting to 50,000 to 70,000 per year.[243] It was also agreed at this time that in future the double border lines which had been engraved on the back of the hammer would be discontinued, as the process often caused the bending or other distortion of the piece; it seems also that the similar engraving on the top jaw of the cock was dropped at this time, and that the finial of the feather-spring was simplified from a trefoil to a teardrop design, and that the internal lock mechanism was modified by re-designing the length of the sear-spring, making it

shorter, and drilling the lockplate clean through so that two screws were now visible externally to the rear of the cock. A final feature which appears to have been introduced at this time was a change in the form of the comb of the cock: until now it had been, when seen from the side, of a thin and curled forward shape, and when seen from the back, of a broad, leaf-like shape. This was now changed to a heavier, more substantial design which, when seen from the side was broad and fairly straight, retaining a forward curl at the top formed by making a notch in the leading edge of the comb; viewed from the back the new comb was a straight narrow column.[244] Each of these features would have made the lock somewhat cheaper to manufacture, and as there was no reduction in the prices allowed for locks, the profit margins of the contractors were correspondingly increased. A study of the Bill Books for the period indicates no significant gap when it might be expected that these new features would have been explained to the workmen, so it is impossible to say how long it took for these innovations to be incorporated into the completed locks. The omission of the engraving could have taken effect immediately, but each of the remaining features required new techniques or moulds to be made. It is even possible that the introduction of these features was one of the problems facing the lockmakers. It may be significant that in November William Holden told the Board that he had 246 'Double Bridle Round Musquet Locks which was made and intended for the Tower but the Pattern being altered since he cd not dispose of them...' The Board told him to send them in.[245] Holden had supplied locks, as well as barrels, since January, 1776, and it does suggest that by November, 1777, the new pattern lock was being manufactured and that the Birmingham inspectors had turned down his older pattern locks. Returning to the end of August, Edward Hines was appointed resident Lock Viewer at Birmingham, and one assistant Viewer, Ben Bullock, was added to the staff at the Tower.[246] No sooner had Hines got to Birmingham than

he informed the Board that the lockmakers now objected to a central warehouse, and that consequently he had no place to inspect the locks; the Board told him they would not change the new arrangements. By November the situation had deteriorated seriously, and the lockmakers were being prosecuted by the Board for breach of contract, in failing to deliver locks to the central warehouse; apparently outside contractors were inciting the workmen.[247]

Early in December the Master General gave the Board a clean bill of health on Joseph Hunt, a gunmaker recently arrived from Birmingham and already established as a contractor to the East India Company, and Hunt received his first warrant, to set up 200 muskets.[248]

By the end of 1777 it became clear to the Government that not only were the American rebels proving obstinate, but that it was extremely likely the French would take the opportunity of revenging themselves for the comprehensive defeat they had suffered at Britain's hands in the last war. An expansion of the Board's manufacturing capacity was therefore indicated, but there was no headlong rush to dismantle the existing system. We have already seen how the Board were interested in the number of locks which the lockmakers could produce in a week or a year. This was in preparation for the establishment of the 'open contract' system, whereby approved contractors agreed to produce to capacity for the Board until given six month's notice to cease production, and under which deliveries would be acknowledged on the basis of 'Warrants of Justification,' meaning that the warrant would be issued <u>after</u> the delivery and acceptance of a batch of components. Later in December a meeting of the rough stockers with the Board was held at the Tower at which Waller and Loder told the Board they had 30,000 well seasoned stocks available, Tucker had 10,000 and Trested 500, and could produce at those levels 'provided they were not kept waiting for Barrels and Locks.'[249] As events would show, each of these firms produced well in excess of this initial estimate

during the coming years. The Board's cutlers, Loxhams, agreed at this time to produce 2800 bayonets per month.[250]

Another contractor for setting up was approved during December, and Veritas Humphreys (Humphries) received his first warrant for 200 Sea Service muskets.[251] This brought to six the number of new contractors who had been admitted to work for the Board during the year: Tucker and Trested for rough stocking, and Pratt, Davies, Hunt and Humphreys for setting up.

Difficulties with the lockmakers persisted; in mid-December the Board ordered 4000 round carbine locks immediately, without interfering with musket lock production, but a fortnight later they were writing to enquire about the delays.[252] A few days later warrants were issued for 4000 barrels and 1000 locks for Artillery carbine.[253]

Small arms production during 1777 was not what might have been expected, given the expanded manufacturing base.The rough stockers delivered 9100 Short Land muskets, 4750 Sea Service muskets, 1000 Artillery carbines, 164 Royal Forrester's carbines, 342 pairs of carbine-bore pistols and 2300 pairs of Sea Service pistols. The setters up, with James Hirst's production well in advance of the others, completed 13,210 Short Land muskets, 4000 Long Land (Pratt's 2000 had iron rammer stoppers), 10,100 Sea Service muskets (4500 of them Bright, the remainder Black), with Hirst alone supplying 1000 Artillery carbines, 50 Royal Forrester's carbines and 2300 pairs of Sea Service pistols.[254]

The Board was dissatisfied with this performance. Whether or not it was intentional, what began as a simple quest for additional carbine production which would not interrupt the flow of muskets, developed into an auxiliary production programme which produced only an initial order of carbines, but almost 150,000 muskets. At the end of December Thomas Fitzherbert, a large-scale contractor to the Board for horses and drivers, departed for Liège with a Dragoon carbine and bayonet as a pattern, to determine

for what price and in what time the Liègeois would produce 2000.[255] By March of the following year this had already blossomed into a contract for 20,000 muskets & bayonets as well as the carbines and their bayonets.[256]

By the end of January, 1778, the Board had already arranged for the setting up of 3000 Short Land muskets, and had rejected offers from two London gunmakers to set up arms because they wanted payment in ready money rather than 'in the course of the Office' by bill and debenture.[257] Galton & Son of Birmingham began to supply steel rammers from this time, and Thomas Gill became a contractor for bayonets in February, 1778. Richard Hornbuckle, lessee of the Armoury Mills, Lewisham, reported a month later that he could supply 400 bayonets per month, but only if he could find the necessary labour force; he does not appear to have succeeded.[258]

News of the surrender of General Burgoyne's army after the battles around Saratoga, on 17 October, reached Europe in early December and by the middle of that month the French had decided to enter the conflict on the side of the rebel Americans. Attempts were first made to enlist Spain in a tripartite alliance against Britain, but this having proved, temporarily, unsuccessful, the French signed formal alliances with the rebel commissioners on 6 February 1778. Britain was now faced by the French navy in addition to rebel privateers, and by the additional threat of Spanish intervention. What had started as a colonial insurrection had now broadened into a more traditional conflict.

In March twelve wall pieces were ordered sent from the Tower to Woolwich, where they were to be fitted to a like number of Captain Congreve's light 3 pounder field carriages.[259] These were another of the ingenious Captain William Congreve's innovations, similar in design to the amuzette of Marshal de Saxe, and intended for the protection of gun crews.[260] There was still trouble with the supply of locks; Wilson and Pratt had failed to complete their 1777 warrants for Sea Service pistols due

to the lack of locks holding up the rough stockers.[261]

Also in March James Hirst sent to the Board a pattern musket of which he proposed to supply four to five hundred per month. The pattern was sent to the Small Gun Office for inspection, and the Master Furbisher reported that it differed only in the form of the side piece, which was flat-surfaced and longer. Hirst was ordered to proceed with the deliveries, and ultimately some 17,000 of this variant, with a long S-shaped side piece, were delivered.[262] What the background to those and other similar offers is does not appear in the records; whether Hirst's workmen were making such arms for another customer and they could be fitted into the production schedule more easily, or whether some process made it easier and cheaper to produce than the Land Pattern, is not clear. Given the nature of the variation the latter assumption seems most unlikely. The London gunmaker and contractor to the East India Company, Daniel Moore, offered at this time to supply four hundred muskets per month of a pattern which he submitted,.for £1.11.6. each complete; this was ordered to be received and reported on immediately. The Bill Books show that Moore delivered in some 16,332 Bright Sea Service muskets at this price between 1778 and 1780, and it is therefore assumed that the pattern he submitted was of this type.[263]

Delays were apparently occurring in the delivery of proved barrels, for in late March the Board disseminated an announcement that

> it was the Boards positive Commands, that all Barrels delivered for His Majesty's Service shall be proved as soon as possible after they are received for that Purpose,-and that no Barrels be proved for the East India Company or any other Persons till those for HM are proved.[264]

Since the East India Company, after using the Tower private proof for ten years, from 1766 to 1776, was now back with the Gunmaker's Company proof house, and since both the Hudson's Bay and African company had always been with the Company, it is more likely that the civilian

trade was the root of the problem.

Delays there undoubtedly were, but by the end of June there were warrants out for 22,700 Short Land muskets to be rough stocked, as well as 4200 pairs of Sea Service pistols, 800 Dragoon carbines, and 400 for Serjeants, and other warrants to set up 24,400 Short Land muskets, the Dragoon carbines, 200 Sea Service muskets and 600 pairs of the Sea Service pistols.[265] With the traditional enemy in the offing, a sense of urgency and purpose can be sensed in the increased tempo of the Board's affairs. The Daymen in the Small Gun Office were now permitted to work from 5 a.m. until 8 p.m.[266] In July, the London gunmaker Michael Memory, who had asked to work for the Board in February, 1777, was given his first warrant, to rough stock 500 muskets; Robert Ross of London, of whom nothing else is known, received warrants to rough stock and set up 200 muskets in August and September, and in September John Harrison, also of London, was admitted to work for the Office and began his tenure with a warrant for rough stocking and setting up 500 Long Land muskets.[267]

In August, 1778, orders were given to prepare four amusettes which were to be sent to Coxe Heath Camp in Ireland, and this was followed by orders to cast twelve barrels of five foot length to replace those sent to Ireland.[268] Whether or not he actually designed these pieces, the Marshal de Saxe is credited with first publicising them in his autobiographical 'Mes Reveries' which, although written in the 1730s, was first published in 1757. Saxe gives only an engraving of his amusette, which is fitted with wheels. The barrel is a long thin affair with trunnions fitted. The Hessian Feldjägercorps then serving in America with the British army often used amusettes in its operations with seeming success, and this is probably where the idea came from to furnish some of them to the Loyalists troops later in the war.[269]

Presumably because of the greatly expanded production programme, the Board discovered in October that it had run out of money, and was £198,176.19.10. over its annual

Parliamentary grant, and the artificers were sixteen months in arrears of pay; John Pratt had indeed complained the previous May, saying he was owed £6.030. 'having received no money since first employed.'[270] This revelation in no way seems to have affected the continued placing of warrants, and there were no other recorded complaints, or references to the deficit. During the second half of 1778, warrants to rough stock 27,000 Short Land muskets, 2000 Sea Service muskets, 200 wall pieces and 2000 pairs of Sea Service pistols were issued, and of these warrants were issued to set up 23,500 of the Land muskets, 3500 Sea Service muskets, and 1000 pairs of Sea Service pistols.[271]

Small arms production during 1778 amounted to 45,510 Short Land muskets, 4990 Long land muskets 22,000 Sea Service muskets, 750 Light Dragoon carbines with flat locks, 800 Eliott carbines, 1500 Artillery carbines, 400 Serjeant's carbines, 800 Dragoon carbines, 200 wallpieces, 6000 pairs of Sea Service pistols, 500 pairs of carbine-bore Land pistols, and 300 pairs of Royal Forrester's pistols in the rough stocked state, of which 42,965 Short Land muskets, 7000 Long Land muskets, 5893 Sea Service muskets, 200 wall pieces, 1000 Artillery carbines, 850 Light Dragoon carbine (of which 250 by Pratt were described as having 'bolts and ketches to ye nosecap'), 800 Dragoon carbines, 400 Serjeant's carbines, 1200 pairs of 9-inch barrelled Light Dragoon pistols, and 3800 pairs of Sea Service pistols were set up. John Pratt was far and away the most productive of the setters up, accounting for 20,000 of the 42,965 Short Land muskets and most of the pistols.[272] In addition to the domestic output, at least 42,000 arms and 10,000 walnut musket stocks had come from Liège during the year, doubling the number of available muskets.[273]

By mid-January 1779 the unfortunate John Pratt claimed to have completed £11,484. in work for the Board, but had thus far received only £1,000. in payment. In reply to his request for some cash, wherein he stated he

was in great distress, the Board minuted that he should be sent £1,000. 'when it can be spared'; and yet he continued to be a leading setter up.[274] In January John Horsley, contractor for bayonets, completed his first warrant for 12,000 and was promptly given another for the same number.[275] The following month more bayonet contractors were admitted to work for the Board: Samuel & George Harvey, and Samuel Dawes, both of Birmingham. It is clear that another long-standing monopoly, that of the Loxhams (since 1755) for the supply of bayonets, had been effectively broken.[276] Expedients were being increasingly resorted to in the search for greater production. Daniel Moore was ordered to deliver in 3000 complete Sea Service muskets, the same as the previous 6000 already delivered; Oughton, normally a barrel contractor, was allowed to deliver in 400 musket locks in one month's time; Isaac Bissell, a large producer of the all-metal Highland pistols as purchased by regimental colonels, was allowed to deliver 500 musket barrels in three months; Pratt was to supply 1000 muskets, all of which except the barrels he was to supply himself, as well as 2000 complete Bright Sea Service muskets the same as Moore's; William Grice submitted a round pattern Sea Service lock, which was rejected as unfit for the purpose; and finally, a price increase for pistol-bore pistol barrels (primarily used for Sea Service pistols) to 5/6 per pair (the same as allowed during the Seven Years' War) was allowed to Galton & Son and John Whately in hopes of speeding up deliveries.[277]

On 30 April Colonel Harcourt, commanding the 16th Light Dragoons then in America, wrote the Board requesting an issue of '54 Rifle Barrel Carbines' for his regiment, as part of the arms taken to America in 1776. The evidence is strong that he had privately purchased some rifles early in 1776, or had received a small number of the 1776-contract rifles made in Birmingham and Hanover. However, these were not specifically mentioned in the King's Warrant of 8 March for arms for the regiment,

to replace those left in North America by order of the Commander-in-Chief (North America), and the Board replied that they could not, therefore, be issued; and furthermore, the Commander-in-Chief, Lord Amherst, had observed that the 16th was reduced in numbers to the same size as other Light Dragoon regiments, and that they can have no more to serve on foot.[278] As the 16th were now back in England, they no longer had any use for this specialist weapon suited to North American conditions.

John Harrison, a London gunmaker who had become a contractor supplying complete Sea Service muskets only the previous year, died early in 1779, and in April his widow, Mrs. Penelope Harrison and James Thompson, Harrison's son-in-law, petitioned to be continued in the Board's employ; they were approved by the Board and granted another warrant for complete Sea Service muskets in the name of Harrison & Thompson.[279] This method was the chief means by which the Board acquired its Sea Service muskets during the American War; other contractors who supplied such complete arms were Edward Bate, Michael Memory, and Daniel Moore, who between them furnished the Board with some 29,900 muskets. To this number John Pratt added another 9053 complete Sea Service muskets, at least 500 of which are described as having double-bridle locks, the design of which remains unidentified.[280] Like Hirst's S-sideplate arms, (which were also delivered in by Pratt during 1779), these were probably another wartime expedient with a degree of variation accepted by the Board as tolerable under the pressing requirement for arms. It is therefore very surprising to find the Board,in June, 1779, writing to the gunmakers Griffin & Tow, Robert Ross, and their own Viewer, Ambrose Pardoe, that 'no musquets are wanted rough stocked at present,'[281] just at the time when they were writing to Birmingham that the several barrel makers were to send Short Land musket barrels with all possible dispatch, and when other expedient arrangments with Hirst and Pratt were made whereby they agreed to complete 4500 and 4304 (respectively) Short Land

muskets using the King's barrels and stocks.[282] Whether it was seen by the Board as a matter of the finite work force being too much fragmented by the entry of additional contractors, or whether it was a question of the contractors expecting to be paid in ready money, or possibly one of simply reaching a capacity production with no consideration being given to long-term requirements, is unclear from the surviving documents. If the general frame of reference within which the Board operated is considered, then their usually pragmatic approach would suggest that they felt sufficient arms were being produced, taking into account foreign arms arrangements, to meet demands for the foreseeable future, and that their concern with existing contractors was simply a part of getting the most for their money. This view is given support by the Board's refusal in July of an offer from Herr Splittgerber, proprietor of the Prussian State Arsenal at Potsdam, to supply 100,000 stand of arms at 27/6 each delivered to the Tower. The Board said they wanted no more muskets at present, but would be pleased to receive a pattern of the arms offered for future reference.[283] The arms offered, to judge by a sealed pattern still in the Tower, were very different from the British service arm in both vital measurements such as bore and barrel length, and would have required many changes in ammunition, maintenance and equipment. Since they were already in existence, no significant changes could be made in the design to avoid these changes. The arms being supplied from Liège were made to the current British pattern and differed only in degree of finish.

In September one of the more bizarre British military small arms came on the scene, when a warrant was given to lockmaker Henry Nock to manufacture twenty pieces to a design of one otherwise unknown James Wilson. This was a short shoulder arm fitted with seven barrels (six clustered around a central barrel) and fired simultaneously by one lock. It was intended for naval use, being used to help clear the decks of enemy sailors, gun

crews and boarding parties, and was seen as a weapon for men stationed in the fighting tops on the masts of naval vessels. Nock was chosen to produce the novel arms at the expressed wish of the inventor. They enjoyed a chequered career.[284]

Production for 1779 reflected the greatly increased military and naval commitment of the country. Sixty thousand sets of Land musket furniture and 400 sets for carbines were delivered. The four rough stocking firms supplied 51,000 Short Land muskets and 2000 Long Land muskets, 2000 Sea Service muskets, 2500 carbines, 400 Serjeant's carbines, 100 'Blues' carbines, 184 musketoons, 900 pairs of 9-inch Light Dragoon pistols and 4000 pairs of Sea Service pistols. Complete arms turned in by the several contractors included 7984 Short Land muskets, 16,985 Short Land with S-side pieces, 330 Long Land muskets and 24,373 Sea Service muskets. Arms set up in the traditional manner included 49,841 Short Land muskets, 9100 Long Land muskets, 100 wall pieces, 1000 Sea Service muskets, 184 musketoons, 956 Artillery carbines, 1220 Eliott carbines, 800 Serjeant's carbines, 500 Cavalry carbines, 100 'Blues' carbines, 2594 unspecified carbines, 750 pairs of Light Dragoon pistols, 150 pairs of Royal Forrester's pistols, and 6150 pairs of Sea Service pistols.[285] Domestic production therefore netted the Ordnance some 84,240 Land muskets, but there were still large numbers of muskets arriving from Liège.

Thomas Fitzherbert had continued to superintend the shipping of muskets from Liège, along with rough stocks. Unfortunately the accounting system lacks detail, and while amounts of money can be acurately totalled, these include the various freight and shipping charges and cannot be divided out to determine the precise number of arms involved. There is one mention of 5000 arms and 2000 stocks to be imported in March, and by September Fitzherbert was informing the Board that 1000 arms were ready for shipment from Holland and that another 2000 might have been ready but that he had run into

difficulties with the workmen over rumours that he was to be supplanted by another firm. One of his workmen was already reportedly making arms from his pattern for the new firm. This rumour proved all too true, for on the same day they replied to Fitzherbert without any mention of this rumour, telling him simply that they would fulfil their engagements with him and that they expected he would do likewise, they wrote to George Craufurd and made an arrangement with him. Craufurd had written that Fitzherbert did not have sufficient contacts to procure any large quantity of arms, and that to forestall any other power getting control of the limited number of good workmen and materials, he had contracted in June for several thousands which were ready for proof. He offered to deliver from twenty to forty thousand arms at the rate of 800 per week, with ramrods and bayonets of tempered steel, for 27/6 each free of all charges on board the ships in Holland. The Board accepted his proposal with a security to be posted of £2000.[286] During 1779-80 Fitzherbert had been paid £42,543., which at 27/6 per musket amounts to 30,940 arms, but this must be an incorrectly high figure since some of the money was for gunstocks (at 1/9 each) and charges.[287] A total figure of not less than 25,000 during 1779 seems reasonable. While the ethics of the operation are undoubtedly questionable, there is no doubt that Craufurd proved far more capable of delivering large numbers of arms, and his ultimate treatment by the Board somewhat redresses the balance. On 7 December a Royal Warrant was obtained for the purchase abroad of a further 40,000 stands of arms, beyond those which had been agreed with Craufurd in September.[288]

The only group of Liège-made Short Land Pattern muskets from this period which has yet been identified is at Hampton Court Palace, although a number have been lent to the Royal Armouries as examples of the type. Apart from the Liège barrel-maker's sunken poinçons at the breech of the barrel, slight variations in the contouring of the buttplate tang, and the very crude engraving on the lock,

the use of European walnut, and the generally coarser finish on both wood and metal parts, there is nothing to distinguish these arms from the domestic product. All those thus far examined conform to the Pattern 1768, with the 1775 modification to the flat-surfaced side piece, and the old style of lock with engraved top-jaw and hammer. It is possible that some of the muskets made under the agreement with Craufurd may incorporate later features, but this is fairly unlikely as it would have involved changes to moulds and increased costs and probable delays which the Board would have been most unwilling to sanction.

On 1 January 1780 the Board were informed that there were no Sea Service musket parts in store, but that 7000 barrels were available to be cut and new looped for this service; these were immediately divided between Hirst and Pratt for the work to be performed. The absence of parts could hardly have been an unexpected announcement, since such a large part of the Board's supplies of Sea Service muskets had been supplied complete by the contractors for most of the war period, but it does nevertheless clearly demonstrate the Board's primary attention to the mainstream, Land musket, production. A further 4000 barrels were issued to Pratt later in January to be cut and new looped.[289]

By early April when Henry Nock notified the Board that he had completed 49 of the seven-barrelled guns, he was asked how many he could deliver in a given time, and told to send in all those he had ready; Nock replied that he could provide 1000 guns in a twelvemonth, if a large number were ordered at one time- he received a warrant for 500. James Wilson, the inventor, was now ready to go aboard a ship to demonstrate the effectiveness of his idea; on 18 April he submitted a list of expenses for inventing and developing the seven-barrelled gun amounting to £1023., having previously requested some small civil employment of £300. per annum. The Board were aghast: '... the above account of Expences is so much beyond the

Board's expectations that they cannot give any opinion thereon, nor can they venture to recommend Payment thereof.'[290] A few days later the Master General notified the Board that he expected they would show the usual mark of approbation which the Board gave to gentleman inventors of Wilson's rank, 'in proportion to the rewards they generally grant for Inventions of real Utility.' The Board enquired into its precedents, and on 23 May Wilson was granted £400.[291] Nock was only protected in his monopoly of manufacture of these guns by his low prices; when he requested payment for those thus far produced at the rates of £15. for the rifled (only two of which were ever produced) and £13. for the smooth bored, the Board ordered the bills monied, and instructed Nock to make no more of the rifled version until further notice. They also recorded that William Wilson, Daniel Moore, John Pratt, Michael Memory and Harrison & Thompson had each offered to make the guns, but none of them at such a low figure as Nock's.[292] By the end of 1780 Nock had delivered 524 smooth-bored seven-barrelled guns; only 23 additional were delivered in January 1781, with a final six of this first pattern in April, 1784.[293]

Richard Trested, one of the Board's wartime rough stockers, requested more work late in April. The Board told him that when barrels and locks became available he would have his share, and with regard to setting up, which he had also requested to do, they told him that there were already more people than could be employed in that area- but, if he could get a supply of Sea Service pistol barrels and locks, he could set those up at the usual price and conditions. The Bill Books show that he rough stocked 1000 pairs of these pistols during the year.[294] By the middle of the year it was clear that 1779 had been a peak year, and that requirements were well down; Wilson, Harrison & Thompson, Davies and Memory were all informed that there was no work for them.[295]

In Liège John Colgate, the Board's resident viewer, had viewed 50,000 arms, which Craufurd asked the Board to

purchase, but in mid-July the Board informed Craufurd that they did not want the arms, and that they had been viewed without obligating the Board to take them. This was shortly followed by a rather strange letter to the Board from the Master General, in which he told the Board not to buy the Craufurd arms, and that he had always been against the purchasing of foreign arms unless in absolute necessity. If the goal was to prevent them falling into enemy hands, they should be averted by employing London workmen to keep them from selling to the wrong people. In a second letter of obvious political context, he went on to say that he was well aware that complaints would come from the domestic workforce if any more foreign arms of inferior quality were allowed in, for which ready money was paid, while the home manufacturers were unemployed and waiting payment. All the Board could say in reply was that warrants for more home-produced arms would be issued as soon as room could be found in the storehouses.[296] This situation was not helped by the arrival of 11,160 arms returned from the Ordnance stores in New York City, as being superfluous to requirements there. Questions were asked about this return, since 5500 stand had been sent out early in the year for New York, Quebec and Georgia, and many of the arms now returned were in un-opened chests. [297]

In November the Board lost one of its most productive contractors, although several of his various warrants were not completed until 1781. An enquiry showed that £9d bribe had been paid to the Viewers to pass work not quite up to standard, and four gunsmiths were dismissed for disobedience of orders, while three contractors, notably John Pratt, were no longer to be employed by the Office. The other two contractors were Riddle and Savage, whose functions have not been identified in the records. A year later Pratt applied to get his position restored to him, but without success. In 1790 he was allowed to supply about 250 Sea Service muskets, but after that no more is heard of him in Ordnance records. [298]

In December, Ambrose Pardoe, a Whitechapel gunmaker who had been an Ordnance Viewer since April, 1766, petitioned to succeed the recently deceased William King as Master Furbisher, which was approved. Pardoe had acted as Head Viewer for the Ordnance in Liège, spending forty-seven weeks there in 1778-9 inspecting the arms made under the arrangement with Thomas Fitzherbert, who had paid him 4/- per day.[299]

As noted earlier, small arms production in 1780 showed a decline over the previous year. Only 15,000 sets of Land musket furniture were delivered in, and the rough stockers provided 14,798 Short Land muskets, 11,829 Long Land muskets, 2000 Sea Service muskets, 90 Artillery carbines, 16 Serjeant's carbines and 5000 pairs of Sea Service pistols. Complete arms turned in by the various contractors included 2039 Short Land muskets with S-side pieces, 2120 Short Land muskets, 16,957 Sea Service muskets, and 4328 pairs of Sea Service pistols. The setters up delivered 17,419 Short Land muskets, 4829 Long Land muskets, 4895 Sea Service muskets, 116 Cavalry carbines, 89 Artillery carbines, 16 Serjeant's carbines and 2750 pairs of Sea Service pistols. It was very fortunate that the Board's requirements were on the wane, since the now-dismissed Pratt had been responsible for the supply of a majority of the arms set up, as well as for some complete and more than 7500 of the rough stocked muskets.[300]

The year which was to see the last large land battles of the American Rebellion, culminating in the surrender of Lord Cornwallis' army to a far larger Franco-American force at Yorktown, Virginia, in October, was one of much reduced activity on the part of the Ordnance. There was very little new production, and that centred on carbines, while in July a large number of imprests were made out to the gunmakers on their long-overdue bills.[301] It was also the year in which General John Burgoyne succeeded in having a special pattern of oval-mouthed musketoon made by the Ordnance for his newly-raised regiment, the 23rd Light

Dragoons, which was ordered to India. In his initial letter to the Board in September, Burgoyne described the arm as a blunderbuss, of which he desired sixty to be made, but the Board always referred to it as a musketoon. Burgoyne also sent in a pattern pistol, but after Pardoe had examined it and judged it 'much inferior' to the Office-pattern Light Dragoon pistol, production of this new design was denied by the Board, as well on grounds of lack of time as inferiority of design, since Burgoyne's regiment was close to departure. Burgoyne's repeated attempts to insist on his pistol design were successfully resisted by the Board. In October, the new musketoon, of which one hundred were to be made, was priced at £1.13.4., and Samuel Galton was warranted to make the barrels for 7/- each. A warrant for the issue of sixty musketoons to the 23rd Light Dragoons was issued on 3 November, but Hirst and Alexander Davidson did not receive their warrants to set up the arms until 20 December. Only sixty of the musketoons appear to have been completed, early in January, 1782, in the same week that Burgoyne's regiment sailed.[302] These musketoons were fitted with a 16-inch barrel, the elliptical muzzle of which measured 1½"x1"; the Eliott pattern of grooved rammer and notched nosecap were used, and the conventional 'Extra flat' carbine lock. The side piece was similar to that on the 'Blues' carbine.[303] The precedent for this type of carbine for mounted troops came primarily from Austria, where elliptical-mouthed musketoons for cuirassiers had been issued in two models, 1759 and 1781, at a rate of 12 per squadron. These were altogether larger weapons than Burgoyne's, but the concept was identical. They were withdrawn from the Austrian service in 1798.[304]

The supply of carbines and pistols in store was so low that requisitions for these types of arms for New York and Georgia had to be filled with substitute arms, including 12-inch Dragoon pistols in place of the 9-inch ordered, and Liège-made carbines with bayonets in place of cavalry carbines. Warrants for 3000 pairs of Light Dragoon

pistols and 1000 carbines were issued in October and November, to complete a warrant for provincial troops in South Carolina.[305]

In September a warrant was issued for four amusettes with their carriages and harness to be sent to New York for the provincial forces, but a minute of the 27th indicates that they were for Benjamin Thompson's (later Count Rumford) King's American Dragoons which was destined for the Virginia campaign.[306] This is the last reference to this piece of compromise mobility in the Ordnance records.

In the course of 1781, 10,500 sets of musket furniture, 1142 sets for Eliott carbines, sets for 2800 pairs of Light Dragoon pistols, as well as other smaller varying amounts for 'Common' and Serjeant's carbines, Sea Service muskets and pistols and wall pieces were delivered in. Although totalling only small numbers of each sort, it was the most comprehensive order for furniture placed during the war. The rough stockers delivered in no Short Land muskets, 6134 Long Land muskets, 833 carbines, 146 pairs of 12-inch carbine-bore pistols and 107 pairs of Sea Service pistols. Harrison & Thompson was the only contractor to deliver in completed arms in 1781, 1000 Bright Sea Service muskets. The setters up produced 2735 Short Land muskets, 976 Short Land muskets with flat-S side pieces, 6000 Long Land muskets, 450 Eliott carbines, 350 (naval) musketoons with flat locks and wooden rammers, and 220 pairs of 12-inch carbine-bore pistols with wood rammers.[307]

The strictures of the Master General on the acquisition of further foreign arms began to have some effect during 1781. In reply to a statement by Craufurd that he stood to lose £4000 if the Board would not take another 5000 arms, the Board gave a completely unsympathetic response.[308] This is the only reference to the question of the Liège muskets in the records for 1781, leading to the conclusion that very few, if any, arms were received from this source during the year.

Late in December a number of warrants for small arms, all dated 1 January 1782, were issued to the gunmakers. These included 6000 rough stocked Land muskets, 7000 Land muskets to be set up in one month, and in six weeks 1700 Sea Service muskets; and, in two weeks, 1000 Eliott carbines.[309]

On the actual first of January, 1782, a further warrant for the setting up of 3000 pairs of Sea Service pistols was issued.[310] Further warrants for the setting up of a total 8940 Land muskets were issued on 27 March to Hirst, Bate, Harrison & Thompson, Davidson, and a new contractor, London gunmaker Daniel Goff, who apparently replaced Tompson Davies, who was appointed a Viewer in the Small Gun Office with pay from 1 March.[311]

In late February the Assistant Inspector of Artillery, Captain Samuel Tovey, reported on a trial of the seven-barrelled gun. Tovey found that when using a charge of one-half dram of rifle powder in each barrel the recoil was noticeable, but that if a similar charge of ordinary service powder was used, it was not. He requested the Board to fix the type and charge of powder for cartridges for these guns, and that a proportion for each class of ship in the Navy be determined; the Board specified common service powder.[312] The Admiralty had already fixed upon a proportion for seven barrelled guns as early as August, 1779, but the details have not been found.[313]

The fall of the North ministry in March, 1782, brought Charles Lennox, third Duke of Richmond, to the office of Master General of the Ordnance. With a brief politically inspired hiatus from April to December, 1783, Richmond was to remain in office until 1795. ~~His many distinguished contributions to the Ordnance are discussed in Chapter Four~~.

In June, 1782, the Board informed James Craufurd that they would now take the 5000 Liège muskets of the late contract, if he would have them re-inspected and take a guinea each for them; Craufurd accepted the lower price (a

loss to him of 6/6 per musket) but specified they must be examined against the pattern arm sent to him by the Board. By August they had all been shipped to the Tower, and in October Pardoe reported that the pattern musket was inferior in quality to the English arm but entirely fit for service; from its construction it would not last half as long as the English made arms. The Board responded that if the locks were as good as those formerly received from Craufurd, then they could now be accepted; Pardoe verified this feature and they were duly received into store.[314] There appear to have been at least another 5000 arms still in Liège, but these were not dealt with until 1783.

Small arms production in 1782 reflected the full storehouses of the Office, as well as the shortages of the various types of carbines and pistols. Musket furniture production amounted to 9000 sets, as well as 360 sets for the Eliott carbine. The rough stockers delivered no Short Land muskets, 9634 Long Land muskets, 122 wall pieces, 667 unspecified carbines, 500 Artillery carbines, 300 Serjeant's carbines, 1950 Light Dragoon carbines with flat locks, 10,949 Sea Service muskets, 90 Burgoyne's musketoons, 350 naval musketoons, 3474 pairs of carbine-bore Land pistols, 600 pairs of Light Dragoon pistols, 1000 pairs of Sea Service pistols. Of these the setters up completed 7040 Short Land muskets, 5000 Long Land muskets, 4630 Sea Service muskets, 122 wall pieces, 500 Artillery carbines, 400 Light Dragoon carbines with flat locks, 2069 Eliott carbines, 200 Serjeant's carbines, 60 naval musketoons, 60 Burgoyne's musketoons, and 6497 pairs of Sea Service pistols.[315]

The outgoing Master General, Viscount Townshend, had apparently made arrangements for the manufacture by the Office of some carbines and pistols for a Volunteer regiment of cavalry under his command, the Norfolk Rangers. In January, 1783, the Master Furbisher and Clerk of the Small Gun Office asked the Board whether these arms were to be actually provided by the Office or money paid in lieu for them; the Board replied on 21 January that

they should be supplied by the Office 'with all possible dispatch.' [316] Ten days later Townshend wrote the Board also requesting that they be completed as soon as possible, to which the Board replied that the Master General had written to the Secretary of State to know the King's commands whether the arms would now [with the end of hostilities] be issued. On the same day the Master Furbisher was ordered to stop work on the arms, and report what stage of progress they had reached.[317] On 14 March word was conveyed to the Board that despite a mistake in the warrant for these arms, the King wished that they should be supplied, and their issue was ordered accordingly. By 28 April the Board had learned from Pardoe that all of the arms had been completed before the orders countermanding their production had been received.[318] Pardoe had been in charge of the manufacture of these arms, and submitted a bill for 100 carbines 'with joint bayonets' at 35/- each and 2½ pairs of pistols 'with moveable Butts' at 45/- the pair. Subsequent to this original order, 100 pistols with moveable butts 'in the German manner' were ordered, the separate butts being made by Henry Nock for 10/- each pair.[319] The carbine is a conventional Eliott pattern to the barrel of which a bayonet blade and base plate has been hinged near the muzzle. The point of the bayonet is held by a small cup on the end of a rod which runs along the barrel to the breech where it terminates in a button. On pulling back on the button the bayonet point is released and the blade swings forward to lock on a spring-held barrel-boss.[320] No positive identification of the pistols with their detachable butts has yet been made, although there are several possibilities extant.

Peace negotiations had been in train since April, 1782, and preliminary articles were signed between the rebellious colonies and Britain on 30 November 1782, with similar preliminaries between France and Britain and Spain and Britain being signed on 20 January 1783. On 4 February the British Government proclaimed a cessation of

hostilities, and four days later the Board ordered its resident Birmingham inspectors to give notice to the contractors that no further stores would be received from them, and to return to the Tower immediately.[321]

Small arms production for the Board of Ordnance during the eight years of the American Rebellion failed to reach the levels achieved during the Seven Years' War, despite the far greater military and naval commitment which Britain put into this unsuccessful conflict. A total of thirty-eight contractors (there were thirty-seven during the previous war) consisting of 1 brasswork founder, 15 barrel makers, 14 lock makers (including 9 who also supplied barrels), 5 rough stockers and 12 setters up furnished the Ordnance with 247,606 sets of brass furniture, 332,466 barrels, 276,011 locks, 293,254 rough stocked arms and 298,479 set up arms. The weapons produced included muskets, carbines, rifles and pistols as follows:

Muskets	Carbines	Rifles	Pistols
Wall Pieces	Cavalry	muzzle-	Dragoon
Long Land	Eliott	loading.	Lgt Dragoon
Short Land	Artillery	Ferguson	Royal For-
Short Land S-	Royal For-		ester's
side pieces	rester's		'Blues'
Marine or Militia	Serjeant's		Sea Service
Sea Service	Dragoon		
	Musketoon		
	Burgoyne's		
	musketoon		
	'Blues'		
	Light Infantry		

If the list of contractors is reduced to those producing in five-figure quantities, the numbers include the 1 brasswork founder, 8 barrel makers, 7 lock makers, 4 rough stockers and 3 setters up. However, this simple computation is upset by a further production: to these arms produced under the Ordnance System must be added 80,968 complete arms (mainly Sea Service muskets and pistols) furnished in 1779 and 1780 by a small group of eight London gunmakers (Bate, Goff, Harrison & Thompson, Hirst, Memory, Moore, Pratt and Tucker),which represent a clear failure on the part of the System to meet the needs

of the Board.[322] Complete arms in such quantities as this were a harking back to the period prior to the introduction of the Ordnance System, when the gunmakers could deliver in arms the components and workmanship of which had not been inspected or approved prior to their being received as a finished arm. This method had always been made use of to some extent, but the period of the American Rebellion saw its greatest use, and that of the Seven Years' War its smallest implementation by the Board.

Another indicator of failure in the System was the extensive purchasing of foreign arms and components, even though these were produced to an English pattern and under the inspection of a team of Ordnance viewers. This last factor makes it very unlikely that the Board were buying simply to keep the Liège workforce from making arms for the enemy; in the next war a buying policy designed to prevent the enemy obtaining arms was implemented, but during the American Rebellion the policy seems to have been based on the need for a rapid supply of arms which was not sufficiently forthcoming from the domestic producers. Although precise figures cannot be determined from the surviving evidence, it is likely that as many as 125,000 arms may have been obtained from Liège during the war.

The result was, that by the end of 1782 the Board had acquired some 504,000 complete arms which, even in terms of Britain's tremendous logistic effort in fighting the American rebels, French, Spanish and Dutch, represented a bad miscalculation, even though it must be held to be better to have too many than too few arms available. The Board may be said to have achieved its goal of a sufficient supply of small arms for Britain's armed forces, but it was only done by resorting to methods which, either in their nature or extent, must have been considered as retrograde expedients and unsatisfactory by many of the Ordnance hierarchy, especially the Treasurer.

Footnotes to Chapter 4.

1. WO 47/44, 6 Dec. 1754, 340; WO 55/355. 17 Dec. 1754.
2. WO 47/46, 23 Dec. 1755, 567; 24 Dec., 572.
3. WO 47/45, 17 Mar. 1755, 227.
4. Ibid., 25 Mar. 1755, 257.
5. Ibid., 11 Apr. 1755, 335.
6. Ibid., 7 May 1755, 428.
7. Ibid.
8. WO 47/46, 30 Oct. 1754, 384.
9. Guildhall Library, Minute Books of the Worshipful Company of Gunmakers, MS. 5220.
10. WO 47/47, Jan. 1756, 37. The description is based upon examination of arms in the collections of the Royal Armouries, H.M. Tower of London and Colonial Williamsburg.
11. WO 47/48, 10 Dec. 1756, 552. The description is based upon examination of arms in the collections of the Tower of London and the Scottish United Services Museum, Edinburgh Castle.
12. WO 47/46, 24 Oct. 1755, 358.
13. WO 47/47, Mar. 1756, 213.
14. WO 47/46, 4 July 1755, 18.
15. Ibid., 29 Dec. 1755, 385.
16. WO 47/50, 20 Sept 1757, 200.
17. The descriptions are based upon examination of arms in the collections of the Tower of London.
18. SP 41/22, 2 Feb. 1756.
19. WO 47/52, 15 Dec. 1758, 482.
20. The description is based upon an example in the collections of the Tower of London.
21. Survey of the Bill Books (WO 51) 1755-1762). The description is based upon examples in the collections of the Tower of London and Colonial Williamsburg.
22. WO 47/47, 1 Jan. 1756, 61.

23. WO 47/45, 3 Feb. 1755, 84.

24. Ibid., 20 and 25 Mar. 1755, 242,266. Joseph Oughton and Edward Farmer were the two earliest contractors.

25. Ibid., 27 May 1755, 494.

26. WO 47/46, 14 July 1755, 46; 14 Aug. 1755, 158.

27. Ibid., 16 Sept 1755, 231; 17 Oct. 1755, 330; 28 Oct. 1755, 364.

28. Ibid., 30 Oct. 1755, 383; WO 47/90, 1 Aug. 1777, 143.

29. WO 47/42, 3 Aug. 1753, 55; WO 47/46, 23 Dec. 1755, 567; 24 Dec. 1755, 572.

30. WO 47/47, Jan. 1756, 38.

31. Ibid., Jan. 1756, 103.

32. Ibid., Feb. 1756, 213.

33. Survey of the Bill Books, 1755-1762.

34. WO 48/96, 10 Aug. 1756, 589, at a cost of £4700.7.1. or 18.79 shillings each.

35. WO 47/55, 2 May 1760, 367. Warrant 26 May 1759; WO 47/58, 3 July 1761, 8.

36. WO55/355, 26 Apr. 1755; WO 55/356, 14 Apr. 1756; WO 48/98, 16 Nov. 1756.

37. WO 47/47, 1 May 1756, 460.

38. Ibid., June 1756, 639.

39. Survey of the Bill Books, 1756-7.

40. WO 47/49, 31 Jan. 1757, 217; WO 51/200, 158.

41. Survey of the Bill Books, 1756-7.

42. PRO, PMG (Paymaster General's Records) 14/1, 2.

43. SP 41/22, 13 Mar. 1756.

44. e.g., Bouquet Papers, BL Add. Mss. 21,643, 25 May 1758; N.J. O'Conor, A Servant of the Crown in England and North America 1756-1761 (New York,1938), 96; 'The Monypenny Orderly Book, 1758-59' in: The Bulletin of the Fort Ticonderoga Museum, XII, No. 5 (Dec. 1969), 348, 353; Ibid., No. 6 (Oct. 1970), 104, 435-6.

45. O'Conor, op. cit., 96.

46. WO 47/49, 5 Apr. 1757, 363; 19 Apr. 1757, 392-3. Thomas Hartwell had been appointed assistant Master Furbisher and Clerk of the Small Gun Office in 1748, and appears in technical matters far more frequently than his superior, Thomas Hatcher. See Appendix 1.

47. Ibid., 14 June 1757, 591.

48. Survey of the Bill Books for 1757.

49. WO 48/97, passim.

50. WO 55/347, 11 May 1725; WO 55/348, 25 Jan. 1727.

51. WO 48/81.

52. WO 48/87.

53. WO 55/356.

54. WO 48/97, 5 Aug. 1757; WO 48/98, 30 Aug. 1758; WO 55/99, 8 June 1759, 10 Aug. 1759; WO 48/100, Oct. and Dec. 1759.

55. WO 47/59, 12 Jan. 1762, 30.

56. e.g., WO 47/52, 15 Dec. 1758, 482; WO 47/54, 7 Sept 1759, 244; WO 47/55, 12 Feb. 1760, 127.

57. WO 55/357, 25 July 1757, 24 July 158; WO 55/358, 18 Sept 1758.

58. WO 55/359, 1 May 1759, for 2080 carbines with wooden rammers and bayonets and 2160 side pistols & straps.

59. Ibid., 29 June 1759, 27 July 1759 (Fencible Men of Argyll), 10 Aug. 1759 (Sutherland's), 27 Aug. 1759 (Keith's).

60. WO 55/359, 27 Aug. 1759, 23 Oct. 1759; WO 55/360, 19 Dec. 1759, 13 Mar. 1760; WO 55/362, 2 Nov. 1761, 10 Nov. 1761; WO 55/363, 5 Oct. 1762.

61. e.g.,'The Monypenny Orderly Book 1758-59'in: The Bulletin of the Fort Ticonderoga Museum, XIII, No. 2 (June,1971), 183-4; A.D. Doughty (ed), The Journal of Captain John Knox (Toronto,1914), I, 209, 350; SP 41/23, 68.

62. WO 55/358, 24 Dec. 1758; WO 55/360, 16 Nov. 1759.

63. WO 55/361, 27 Feb. 1761; WO 55/362, 16 Mar. 1762.

64. WO 47/50, 9 Sept 1757, 179-80.

65. Ibid., 23 Dec. 1757.

66. Survey of the Bill Books for 1758.

67. WO 47/48-60, passim.

68. Survey of the Bill Books, 1755-58.

69. Survey of the Bill Books for 1758.

70. WO 47/53, 5 Jan. 1759, 21; 12 Jan. 1759, 46.

71. Ibid., 19 Jan. 1759, 86; 9 Feb. 1759, 165.

72. Ibid., 9 Feb. 1759, 169; 10 Feb. 1759, 178.

73. Ibid., 3 Apr. 1759, 399.

74. WO 55/359, 23 Mar. 1759; WO 47/55, Jan. 1760, 103.

75. WO 55/359, 10 Aug., 15 Oct. 1759; WO 55/360, 28 Jan. 1760.

76. WO 55/360, 9 Nov., 10 Dec. 1759.

77. Ibid., 12 Nov. 1759.

78. Ibid., 16 Apr. 1760. W.E. Manners, Some Account of the Military, Political and Social Life of The Right Hon. John Manners, Marquis of Granby, P.C.,M.P., D.C.L. (London,1899), 120.

79. Description based upon examples in the collections of the Tower of London and The Royal Collection at Windsor Castle.

80. Description based on a second-production example in the collections of the Tower of London, and on A.E.H. Miller & N.P. Dawnay, Military Drawings and Paintings in the Collection of H.M. The Queen (London, 1966), I, item 82.

81. Francis Bannerman & Co., Military Goods Catalog, Jan. 1938, item 8614 with engraving of pistol.

82. WO 47/55, 20 May 1760, 416; WO 47/56, 24 Oct. 1760, 319.

83. WO 47/63, 20 Jan. 1764, 16.

84. WO 47/55, 18 Jan. 1760, 64; 20 May 1760, 422; WO 47/56, 24 Oct. 1760, 318; WO 47/61, 20 May 1763,324.

85. Survey of Bill Books for 1759.

86. WO 47/55, 4 Jan. 1760, 14.

87. WO 47/54, 4 Dec. 1759, 464-5.

88. WO 47/55, Feb. 1760, 136; 26 Feb. 1760, 169; WO 47/56, 19 Dec. 1760, 454.

89. WO 47/55, 15 Feb. 1760, 136.

90. WO 47/56, 15 Aug. 1760, 132.

91. WO 47/55, 11 June 1760, 491.

92. Ibid., 25 Apr. 1760, 335.

93. Survey of the Bill Books for 1760.

94. WO 47/57, 20 Jan. 1761, 43.

95. Ibid., 3 Mar. 1761, 143.

96. WO 47/58, 3 July 1761, 8.

97. WO 47/57, 17 Apr. 1761, 248.

98. WO 47/58, July 1761, 25.

99. Survey of the Bill Books for 1761.

100. WO 47/59, 23.

101. Ibid., 5 Feb. 1762, 109.

102. WO 55/362, 25 Feb., 7 May 1762; WO 47/59, 3 May 1762, 374.

103. WO 55/362, 30 July 1762.

104. Ibid., 1 Oct. 1762.

105. WO 47/59, 14 Feb. 1762, 134.

106. An officer of Scott's Light Infantry, on the attack of Martinique in 1762, quoted in J.S. Corbett, England in the Seven Years' War (London,1918), II, 222.

107. Survey of the Bill Books for 1762.

108. Analysis of the Bill Books, 1755-1763.

109. WO 47/61, 28 Jan. 1763, 55.

110. Ibid., 13 May 1763, 257.

111. Ibid., 20 May 1763, 322-4.

112. Ibid., 324.

113. WO 47/62, 16 Dec. 1762, 310.

114. Accounts of these auctions are to be found at the front of each volume of Treasurer's Ledgers (WO 48), and although purchaser's names allow identification of various gunmakers as customers, the entries them-

selves are too vague to enable a useful analysis of disposals to be made. Whole muskets and other arms are occasionally listed, but normally it is barrels and locks sold in lots by the hundredweight, quarters and pounds.

115. Survey of the Bill Books for 1763.

116. WO 47/63, 10 Feb. 1764, 86.

117. Ibid., 24 Feb. 1764, 118; 27 Feb., 125.

118. Ibid., 5 Mar. 1764, 147. Warrant 8 Feb. 1764, WO 55/364.

119. Ibid., 3 Apr. 1764, 316; 17 May, 348.

120. Ibid., 29 June 1764, 489.

121. WO 47/64, 4 Sept 1764, 135.

122. Survey of the Bill Books for 1764.

123. WO 47/66, 27 Aug. 1765, 95.

124. WO 55/365, State of Small Arms &c., 1 Oct. 1765.

125. Survey of the Bill Books for 1765.

126. WO 47/67, 11 Feb. 1766, 58.

127. Ibid., 21 Mar. 1766, 198.

128. Ibid., 8 Apr. 1766, 246, 248.

129. Survey of the Bill Books for 1766.

130. WO 47/70, 10 July 1767, 35.

131. Ibid., 14 July 1767, 42.

132. Ibid., 8 Sept 1767, 148.

133. Ibid., 8 Sept 1767, 145; 28 Aug., 130.

134. WO 47/69, 14 Apr. 1767, 165.

135. Survey of the Bill Books for 1767.

136. Ibid.

137. WO 47/71, 37.

138. Ibid., 12 Feb. 1768, 72.

139. Ibid., 3 May 1768, 224.

140. WO 55/366, 6 June 1768; WO 47/71, 7 June 1768, 278; WO 47/72, 6 July 1768, 5.

141. WO 55/366, 11 June 1768.

142. WO 47/72, 2 Aug. 1768, 47.

143. Survey of the Bill Books for 1768.

144. WO 55/513, 10 Feb. 1769; WO 47/73, 10 Mar. 1769, 125.

145. WO 55/513.

146. WO 47/73, 27 Apr. 1769, 212.

147. WO 47/75, 12 Jan. 1770, 18.

148. WO 55/416, 27 Oct. 1770; description based on an example in the collections of the Valley Forge National Park Museum, Valley Forge, Pennsylvania.

149. WO 47/74, 5 Dec. 1769, 193.

150. Survey of the Bill Books for 1769.

151. WO 47/75, 12 Jan. 1770, 14.

152. Ibid., 2 Mar. 1770, 101; WO 55/367, 15 Mar. 1771.

153. WO 47/75, 9 Mar. 1770, 118.

154. Ibid., 27 Feb. 1770, 93.

155. Ibid., 6 Mar. 1770, 108.

156. Ibid., 20 Mar. 1770, 140.

157. Ibid., 9 Mar. 1770, 119; 31 May 1770, 350; WO 47/76, 3 Dec. 1770, 308.

158. WO 55/526; WO 47/75-6, passim.

159. WO 47/75, 1 May 1770, 236, 8 May, 254.

160. WO 47/76, 13 Oct. 1770, 158.

161. Ibid., 7 Nov. 1770, 219, 16 Nov., 250.

162. Survey of the Bill Books for 1770.

163. WO 55/416 (2), 4 Jan. 1771.

164. Description based on examples in the collections of the Royal Armouries, H.M. Tower of London.

165. WO 47/77, 19 Feb. 1771, 137; 24 Apr., 341.

166. Ibid., passim.

167. WO 47/77, 26 Feb. 1771, 168.

168. Ibid., 1 Mar. 1771, 184.

169. Ibid., 22 May 1771, 439; Bill Books for 1771.

170. WO 47/77, 13 Dec. 1771, 276.

171. WO 47,86, 7 Nov. 1775, 221. Description based on an example in the collections of the Tower fo London.

172. Survey of the Bill Books for 1771.

173. WO 55/367; WO 47/79, 31 Jan. 1772, 65.

174. WO 3/3, 22 Feb. 1772, to Lieut. Col. Smith.

175. WO 47/79, 5 May 1772, 286; 20 May, 313; 29 May, 331; 3 June, 349.

176. WO 3/3, 2 Aug. 1772, to Lieut. General of the Ordnance, H.S. Conway.

177. WO 47/79, 3 June 1772, 346; WO 47/80, 17 Oct. 1772, 164.

178. Survey of the Bill Books for 1772.

179. WO 47/81, 26 Jan. 1773, 36.

180. Ibid., 14 May 1773, 398; Bill Books.

181. WO 47/81, 3 June 1773, 459.

182. Ibid., 15 June 1773, 482.

183. WO 47/82, 10 Aug. 1773, 81.

184. Ibid., 13 Oct. 1773, 81.

185. Ibid., 9 Nov. 1773, 231.

186. Survey of the Bill Books for 1773.

187. WO 47/83, 15 Apr. 1774, 189.

188. Ibid., 193.

189. Ibid., 29 Apr. 1774, 239.

190. Ibid., 17 May 1774, 277.

191. Survey of the Bill Books, 1768-1774.

192. WO 55/369, 13 Sept 1774.

193. B. Cuthbertson, A System for the Compleat Interior Management and Oeconomy of a Battalion of Infantry (Dublin, 1768), Chapter XIII, Article XII.

194. WO 55/369, 19 Oct. 1774.

195. Survey of the Bill Books for 1774.

196. Analysis of the Bill Books, 1764-1774.

197. WO 47/85, 24 Jan. 1775, 27; 14 Feb., 109; 24 Feb., 141; 7 Mar., 176; 24 Mar., 242; 21 Apr., 310.

198. Ibid., 24 Mar. 1775, 242; 21 Apr., 310.

199. Ibid., 23 June, 451.

200. WO 47/86, 11 July 1775, 11.

201. Ibid., 25 July 1775, 49.

202. Ibid., 25 July 1775, 52; Bill Books.

203. Survey of the Bill Books for 1775.

204. WO 47/86, 10 Oct. 1775, 170.

205. Ibid., 15 Dec. 1775, 325.

206. Ibid., 18 Oct. 1775, 185.

207. Ibid., 7 Nov. 1775, 221.

208. Survey of the Bill Books for 1775.

209. By far the best and most balanced account of the war is: Piers Mackesy, The War for America 1775-1783 (Cambridge, Mass. 1964).

210. SP 41/39, 31 Dec. 1775.

211. CO 5/62, 25-6.

212. CO 5/256, 20 Jan. 1776, 10.

213. WO 52/19, 18 Oct. 1776, 81.

214. WO 47/87, 30 Jan. 1776, 47.

215. WO 46/10, 83.

216. Ibid., 28 Apr. 1776, 117.

217. WO 51/269, 30 Sept 1776, 316; WO 51/270, 175; WO 51/271, 73.

218. WO 47/87, 24 June 1776, 533; WO 51/270, 31 Dec. 1776, 354-5; WO 51/272, 114; WO 51/273, 47.

219. E.Kipping & Smith (eds) At General Howe's Side 1776-1778. The Diary of Captain Friedrich von Muenchhausen (Monmouth Beach, NJ 1974), 13; Adam Ferguson, A Biographical Sketch of Lieut. Colonel Patrick Ferguson (Edinburgh,1817), 14-15.

220. PRO, CO 324/44, 16 May 1776, 24 Feb. 1778, 38; 'Official Letters of Major General James Pattison. Part II. As Commandant of the City of New York' in: Collections of the New-York Historical Society for the Year 1875 (New York, 1876), 383-4.

221. e.g. The Queen's Rangers, John Althouse's New York Volunteer Rifle Company, Emmerich's Chasseurs.

222. WO 47/87, 27 Jan. 1776, 40, 43, 49; 9 Feb.,83.

223. Ibid.., 15 Mar. 1776, 220.

224. Ibid., 15 Mar. 1776, 212; 19 Mar., 224; 2 Apr., 302-303; 14 May, 427-8.

225. Ibid., 26 Mar. 1776, 268; 10 May, 413, 418.

226. Ibid., 24 Apr. 1776, 355; 30 Apr., 529-30.

227. Ibid., 29 June 1776, 540; WO 47/88, 5 July, 1776, 4; 28 Aug., 107; 18 Oct., 200.

228. Ibid., 22 Nov. 1776, 295.

229. Ibid., 1 Aug. 1776, 61; 28 Aug., 107.

230. Survey of the Bill Books, 1775-1783.

231. WO 47/85, 3 Mar. 1775, 162; WO 47/88, 15 Aug. 1776, 333.

232. WO 47/88, 3 Dec. 1776, 350.

233. Survey of the Bill Books for 1776.

234. WO 47/89. 86-263, passim.

235. Ibid., 18 Mar. 1776, 330.

236. WO 47/78, 3 Sept 1771, 83; WO 47/89, 1 May 1777, 503-504.

237. Survey of the Bill Books, 1779-80.

238. WO 47/89, 9 May 1777, 546; 6 June, 665; 17 June, 694.

239. Ibid., 24 June 1777, 726-7.

240. WO 47/90, 1 Aug. 1777, 143.

241. Ibid., 149.

242. Ibid., 7 Aug. 1777, 176-7.

243. Ibid., 22 Aug. 1777, 239.

244. Ibid., 29 Aug. 1777, 255. Description based upon examination of a large number of examples in the collections of Colonial Williamsburg.

245. WO 47/90, 20 Nov. 1777, 508.

246. Ibid., 29 Aug. 1777, 261.

247. Ibid., 9 Oct. 1777, 364-5; 4 Nov., 431.

248. Ibid., 5 Dec. 1777, 562.

249. Ibid., 12 Dec. 1777, 581.

250. Ibid., 20 Dec. 1777, 596.

251. Ibid., 595.

252. Ibid., 17 Dec. 1777, 592; 20 Dec., 596.

253. Ibid., 22 Dec. 1777, 615.

254. Survey of the Bill Books for 1777.

255. WO 47/90, 27 Dec. 1777, 616.

256. SP 77/109, 6 Mar. 1778.

257. WO 47/91, 6 Jan. 1778, 3; 13 Jan., 30.

258. Ibid., 26 Jan. 1778, 59; 17 Feb., 129; 23 Mar., 243.

259. Ibid., 13 Mar. 1778, 199.

260. A.B. Caruana, Grasshoppers and Butterflies: the Light 3-Pounders of Pattison and Townshend (Bloomfield, Ont. 1979), 13.

261. WO 47/91, 20 Mar. 1778, 225.

262. Ibid., 23 Mar. 1778, 234, 246.

263. Ibid., 23 Mar. 1778, 240; Bill Books 1778-80.

264. Ibid., 27 Mar. 1778, 255.

265. Ibid., passim.

266. Ibid., 24 June 1778, 572.

267. WO 47/92, 22 July 1778, 74; 9 Sept, 217.

268. Ibid., 21 Aug. 1778, 164; 28 Aug., 190; 22 Dec., 444.

269. J.P. Tustin (ed & trans), Captain Johann Ewald, Diary of the American War (New Haven and London, 1979), passim.

270. WO47/92, 16 Oct. 1778, 317; 5 May, 390.

271. Ibid., passim.

272. Survey of the Bill Books for 1778.

273. WO 47/92, 5 May 1778, 387; 6 June, 511; 24 July, 81, 94; 26 Nov., 395.

274. WO 47/93, 12 Jan. 1779, 21.

275. Ibid., 19 Jan. 1779, 43.

276. Ibid., 6 Feb. 1779, 95.

277. Ibid., 8 Jan. 1779, 10; 30 Jan., 79; 6 Feb., 94, 96; 11 Feb., 105.

278. Ibid., 8 Apr. 1779, 267.

279. Ibid., 15 Apr. 1779, 286.

280. Analysis of the Bill Books, 1778-1783.

281. WO 47/93, 1 June 1779, 407.

282. Ibid., 18 June 1779, 457.

283. WO 47/94, 31 July 1779, 64.

284. Ibid., 21 Sept 1779, 193.

285. Survey of the Bill Books for 1779.

286. WO 47/93, 12 Mar. 1779, 192.

287. WO 47/93-4, passim.

288. WO 47/94, 7 Dec. 1779, 372.

289. WO 47/95, 1 Jan. 1780, 4; 21 Jan., 66.

290. Ibid., 8 Apr. 1780, 254; 18 Apr., 279, 285.

291. Ibid., 22 Apr. 1780, 304.

292. Ibid., 2 June 1779, 407.

293. Analysis of the Bill Books 1780-1784.

294. WO 47/95, 22 Apr. 1780, 305; Bill Books for 1780.

295. WO 47/95, 18 May 1780; 361; 10 June, 426.

296. WO 47/96, 12 Aug. 1780, 125-6, 31 Aug., 154.

297. Ibid., 28 Sept 1780, 209.

298. Ibid.,25 Nov. 1780, 350; Bill Books 1781, 1790.

299. WO 47/67 11 Apr. 1766, 265; WO 47/96, 9 Dec. 1780, 372; WO 47/97, 26 May 1781, 584.

300. Survey of the Bill Books for 1780.

301. WO 47/98, July, 1781, passim.

302. Ibid., 27 Sept 1781, 1030; 4 Oct., 1054; 13 Oct., 1085; 1 Dec., 1222; 11 Dec., 1262; 20 Dec., 1279; WO 47/99, 1 Jan. 1782, 3; Bill Books for 1782.

303. Description is based upon the only identified example in the collections of the Royal Armouries, H.M. Tower of London.

304. A. Dolleczek, Monographie der k.u.k. oesterr.-ung. Blanken und Handfeuer-Waffen (Vienna, 1896), 75-6, 119, Tafel 12.

305. WO47/97, 23 May 1781, 575; WO 47/98, 9 Aug. 1781, 807; 25 Oct., 1112; 1 Nov., 1128, 1132.

306. Ibid., 27 Sept 1781, 1021.

307. Survey of the Bill Books for 1781.

308. WO 47/98, 26 July 1781, 782.

309. Ibid., 28 Dec. 1781, 1294, 1296.

310. WO 47/99, 1 Jan. 1782, 3; 12 Jan., 40.

311. Ibid 27 Mar. 1782, 278; 20 Mar., 245.

312. Ibid., 24 June 1782, 540.

313. PRO, ADM 1/4013, 24 Aug. 1779.

314. WO 47/99. 23 Oct. 1782, 492; 30 Oct., 513.

315. Survey of the Bill Books for 1782.

316. WO 47/101, 21 Jan. 1783, 199.

317. Ibid., 31 Jan. 1783, 132, 134.

318. Ibid., 14 Mar. 1783, 271; 22 May, 508.

319. WO 47/102, 6 June 1783, 77; 23 Dec., 777; WO 52/16, 17; WO 52/19, 96.

320. Description is based on an example in the collections of the Royal Armouries, H.M. Tower of London.

321. WO 47/101, 7 Feb. 1783, 158.

322. Survey of the Bill Books, 1775-1782.

CONCLUSIONS

The Ordnance System was developed in response to the chaos which had dominated the supply of arms during the long period of the War of the Spanish Succession. It was intended not only to bring under direct Ordnance control a larger proportion of the gun making processes, but also to centralize the design of small arms, and remove from circulation the large variety of weapons supplied to the troops by regimental colonels, and to create a greater degree of uniformity of both weapons and weapons management, i.e. drill. Whether it was also intended to eliminate the necessity for foreign arms purchases in time of crisis seems at least doubtful, due to the regularity with which this device was employed with little or no adverse comment in the surviving records.

The System took many years to bring to completion, largely because of the lack of money voted by parsimonious peacetime Parliaments politically committed to the smallest possible armed forces, and to the least possible expenditure on military paraphernalia allowed by the perceived view of national security. The Board of Ordnance appears to have developed the basic lines for the new system during the war years, and to have begun implementing them as soon as was financially practical after the conclusion of peace. They encountered obvious opposition from the Worshipful Company of Gunmakers of London, who had previously had both the design and supply of military small arms largely in their own hands, and indirect obstruction from the opinions, traditions and self-esteem of the regimental colonels and army bureaucracy whom they were intending to bring under much greater control. They enjoyed the active support of the current monarch, George I, who was himself a blooded soldier and an excellent military administrator, but the political situation in England prevented this support from having the effect the Board might have wished.

The first clear indication of a new system being put

into operation came with the contract of 15 September 1714 when the orders were not for complete arms to be supplied, but for 'Land service musquet barrels, stocked and sett up with his Maj: Locks, brass work, according to the pattern'. The barrels, locks and brasswork were taken from supplies accumulated by the Board, and issued to the contractors for mounting in wooden stocks and finishing off. There seems to have been some indecision as to the best pattern for military arms during these years: the 1714 contract called for brass- mounted arms, while the next big contract, for the 'Pattern of the 10,000' was for iron-mounted arms for both Land and Sea Service. With the completion of the 'Pattern of the 10,000' in 1721 the design of small arms appears to have been concentrated on, and in 1722 a new design, for the first time known as the 'King's Pattern' was settled upon and promulgated as the standard. It was also officially laid down at this time that colonels wanting arms made for their regiments would, in future, adhere to this basic pattern. This instruction was largely ignored, and it was not until the major re-armament of 1740-1 that circumstances forced the army into a degree of arms uniformity hitherto unseen in its ranks. There was a hiatus in small arms production from 1721 until 1728 when the first of a new series of arms began to be produced, and it is really from this time that the fully developed Ordnance System came into operation. All of the various components flowed from the contractors into Ordnance stores where they were inspected for quality of workmanship and materials, and for conformity to the established pattern. These materials were then issued to selected contractors for gradual assembly into complete arms, with the processes sub-divided and inspected at each stage, so that by the time a completed arm arrived back in the hands of the Board's officials, it had been inspected and approved at every stage of production from raw materials to completed arm. It was a highly centralized and carefully controlled system involving a minimum of individual contractors who were obliged to work to a very

high standard of pattern keeping, which clearly limited the number of workmen within the unstable gunmaking trade who could be successfully employed.

Fortunately for the development of the System, it was placed under no particular pressure for the first decade of its functioning, and all concerned had opportunities to see how it would work. There were no recorded problems with new production, but subsequent events showed that the quality and uniformity of arms in the hands of the troops up to 1740 had been totally unaffected by the new manufacturing system. This situation may be seen as a very clear example of the typical situation in which manufacture of arms was considerably in advance of the issue of new arms to the troops for whom they were being made. There was no officially established 'service life' for a musket during our period, although the subsequently recognized term of twelve years seems to have been realized in fact during the Eighteenth Century. When there was no need to re-arm the troops, they were not re-armed, and if regimental officers were slack in their attention to the state of their men's arms, the arms soon deteriorated to an unserviceable and often dangerous condition. Knowing this situation to exist, and realizing that the efforts of central government to increase its own control over regimental responsibilities were fraught with long delays and little success, the Board exerted as much pressure as it could to keep new arms in their own hands for as long as possible. Only when the arms of a regiment were passed by Ordnance inspectors as being totally unfit for service were new arms issued on specific warrants from the responsible authorities.

The wars of Jenkins' Ear and the Austrian Succession (1739-48) put the Ordnance System to its first test of responding to wartime demands, and the evidence suggests that it performed as its designers intended. There was a tremendous drain at the beginning of this period when widepsread inspections showed the deplorable state to which the armies' small arms had sunk, and a wholesale re-

armament took place. For the first time the British Army was equipped with a uniform pattern of musket. The only area in which significant expansion of the System was required was that of the setters up, since the components makers were apparently able to furnish more materials than the existing setters up could complete in a reasonable time. Hence, from 1742 about half-a-dozen new contractors were taken on for the duration of the war, and with this addition the System functioned smoothly under the increased demands.

Wartime experience suggested that the expensive iron rammer which had been tried as early as 1724 in British service, was indeed a highly desirable improvement in the efficient use of the infantry musket, and with the return of peace the Board entered on a programme of converting the arms in the hands of the troops to take the new stronger rammer. Virtually all of this work was carried out by the workforce of the Small Gun Office in the Tower of London, and there was almost no contractor activity between the end of the war in 1748 and the build-up for the next conflict in 1755. The System thus proved its elasticity without jeopardizing the tasks undertaken by the Board.

At the opening of the Seven Years' War the Board experienced its first recorded clash with the London guntrade since the founding years of the System, when a combination of contractors refused to work unless prices were considerably increased over what they had been during the previous war. Thanks to the business acumen of a single contractor, John Hirst, the Board overcame this problem, and Hirst became virtually the only setter up employed by the Board for almost twenty years. He was able to command a sufficient workforce to perform the work required by the Board, and during the Seven Years' War the Ordnance System unquestionaly achieved its greatest results with the smallest number of problems. The comparatively recent re-armament of the army, and the relatively small percentage of the troops actively engaged

during the previous war meant that the stores were full of arms of a modern design and in good condition at the outbreak of the new war, and there were fewer foreign arms purchased during this war than at any other time during our period. Among other benefits, this allowed increased attention to the design and production of a series of new arms for various areas of the services which had either been neglected in the past, or had recently come into being to meet newly perceived military requirements. Thus there were muskets for the newly raised marines and militia, and carbines for the cavalry, light dragoons, Highland regiments, artillery (officers, men and cadets), and various elite units. The rifle made its first combat appearance in the hands of British troops, although it was supplied from abroad and apparently used by troops who were largely of foreign birth. With the proliferation of new designs produced, and a total of nearly 305,000 arms delivered during the period, the Ordnance System clearly reached its apogee during the Seven Years' War.

Britain's greater involvement in the war had produced much high casualties amongst both troops and their arms than during the previous conflict, and production of small arms continued at a reduced level for several years following the peace of 1763. Also in the wind was a major re-designing of the infantry musket to allow greater mobility, facility of use, and comfort for the troops. The acceptance of this new design, the Short Land Pattern, in 1768, produced a spasm of components manufacture into the early 1770s, and a proportion of these parts were turned into complete arms before the American Rebellion erupted in 1775. At the same time that the Short Land Pattern became the standard line infantry arm, new carbines were produced for the light infantry and serjeants of grenadier regiments, dragoons and artillery.

That the Ordnance System failed to achieve the objectives apparently set for it by the Board during the American Rebellion was probably due to a number of factors not directly attributable to the structure or operation of

the System itself. It seems likely that the Board over-reacted to the crisis of French entry into the war in 1778, and demanded more than the available workforce could produce without an unacceptable lowering of quality. Even given the raising of the Volunteers from 1779 which created a new and large demand for arms, the ultimate production achieved by various methods was very far above any possible needs of the service. In addition to this domestic over-production, more than 100,000 foreign arms were imported during the war. It was an early instance of over-kill, and one in which the resources of the domestic guntrade were apparently unable to meet the demands of Government if confined to the rigorous standards previously imposed. The alternative was a partial breakdown in the System, and a return to the earlier practices where contractors were allowed to turn in complete arms which had not undergone the several individual stages of inspection before the final acceptance inspection. This would allow the utilization of a portion of the workforce which was normally considered as unable to work to Ordnance standards. Although this was mainly confined to Sea Service muskets, there were also a large number of Land Service muskets accepted on this older system, some with components varying from the established King's Pattern. There were also more labour troubles, this time with the Birmingham lockmakers, an area where the Board had almost no alternative source and where no individual saviour appeared to rescue them as had John Hirst at the beginning of the previous war. The result was a delay of almost two years in the significant production of arms for lack of a major component. This was probably a relevant factor in the subsequent over-production, coinciding as it did with the entry of France into the conflict and turning it into a virtually global commitment for Britain's armed forces. If, however, the end justfies the means, then the Board certainly did achieve its objective in the total acquisition of small arms. The Ordnance System itself produced over 298,000

arms (compared with some 305,000 during the previous war), but the Board acquired a total of about 504,000 arms through the use of other domestic and foreign sources. The number of arms obtained by the use of the established System compare favourably with the commitments of the armed forces, remembering that Britain's involvement during the Seven Years' War included sizeable bodies of troops in North America and on the Continent, while the American Rebellion was, so far as troop concentrations were concerned, largely a matter of troops in North America and an anti-invasion force at home. It seems almost as if the Board lost control of its manufacturing agencies, and let the supplies run on almost unheeded.

The conclusion of the American Rebellion and the war with the Continental powers in 1783 found the Ordnance stores full to overflowing, and the basis of its long established System badly undermined by wartime expediencies. There followed a decade during which there was very little contractor production, and that confined to secondary arms such as various carbines and a few Sea Service muskets. Component production ceased altogether. The personality and views of the Master General who assumed office in 1782 ensured that the vacuum thus created in Ordnance affairs would be filled with a programme of modernization, experimentation and general improvements in the quality of design and materials. But in all of this small-scale work there was no requirement for the Ordnance System to be used, and it was apparently allowed to disintegrate from dis-use. Simplification of arms design, improvement in the quality of materials, and lack of need for large quantities of arms seemed to suggest to those in power that there would be no real need for the elasticity of an Ordnance System when the next emergency arose. Inspection procedures had been pruned during the war, and the processes of rough stocking and setting up had been combined in one firm and allowed to continue. There would be no return to the older methods. During the decade following the end of the war many new

ideas in small arms design were tried, and most were rejected on the grounds of cost v. actual utility in service, but by 1790 it had been decided to change the basic design of the infantry musket. This plan appears to have been thwarted only by the outbreak of the French Rvolutionary Wars in 1793, by which time the tooling up and new gauges for the radically different arms were not well forward in preparation, and there had been too little opportunity for the workmen to familiarize themselves with the new requirements.

With the outbreak of war all thoughts of attempting to return to the old Ordnance System went by the board in the face of overwhelming demand. Not only did the regular army require its arms, but both the Militia and a Volunteer force were called into being, both of which required far larger quantities of arms than those needed by the army alone; in addition there were thousands of refugees from the Revolution who were organized into regiments to fight the new political force, and who were to be armed by the British Government. In the face of this unprecedented demand Liège was lost as a basic source of supply, and British agents combed the European markets to acquire whatever they could of serviceable arms. The supplies of military pattern arms in the hands of the domestic trade were also absorbed, and finally, in 1797, the Board accepted that a lowering of quality and simplification of design for the basic Land Service musket would have to be officially sanctioned in order to make use of those portions of the workforce who could not produce to the usual Ordnance standards. Arms of the 'India Pattern' had been initially purchased directly from the East India Company in 1793, and by 1795 they were beginning to be produced directly for the Ordnance, but in 1797 the adoption of the cheaper design was made official and a large-scale production programme initiated.

The Ordnance never abandoned the intention of returning at the first opportunity to a high quality Land Service musket for the infantry, and with the Peace of

Amiens in 1802 an attempt was made to begin production of the New Land Pattern series. This was abruptly curtailed by the renewal of war in 1804, and the India Pattern continued as the standard arm in the hands of most regiments for the remainder of the flintlock era which ended in the early 1840s. Maximum utilization of the entire domestic guntrade came closest to achievement in the years from 1804 to 1815, when the Tower of London itself became, for the first time, a manufacturing facility on a full-time basis, and the totality of the Birmingham trade were brought into the Board's manufacturing organization. Proof and inspection facilites were established at Birmingham, and complete arms were constructed by the contractors there, as well as components, with the London trade continuing to act chiefly as setters up, or, as they were now termed, rough stockers and setters up. By 1815 some two-and-a-half million arms had been produced, more than two million of which were India Pattern muskets, but the Ordnance System had played no part in their creation.

Can the Ordnance System, then, be credited with performing successfully the role established for it by its originators in the second decade of the Eighteenth Century? The answer to this broad question is a qualified 'Yes.' The System worked without notable fault during the wars up to 1778, when Britain's military and naval commitments were expanded beyond what they had ever been before, and certainly beyond what could have been envisaged in the early part of the century. It may be said that times changed and the System did not change with it, but this is not strictly the case. Times changed, but the overall number of skilled gunworkers did not increase significantly. The bulk of Britain's arms manufacture was in the middling and lower categories of small arms which did not require working closely to a pattern and the use of top-quality raw materials. This requirement did not change throughout and well beyond our period, while the military requirements of Government did both change and

expand. The basic quality guidelines of the Ordnance System did not change, but as quantity requirements increased the numbers of qualified workforce did not increase to meet this new demand, since it was extremely uncertain and periodic, and therefore not worthwhile to train men to meet it. Therefore, while the times and military requirements changed, one essential part of the Ordnance System, the skilled workman, did not grow in numbers in line with the increased requirements. It is in this way alone that the Ordnance System principally failed to meet it goals, and this was a factor outside the control of the Ordnance to remedy. Indeed, the civilian guntrade had always been, and would continue to be, a most unstable industry, with its workforce expanding and declining as the demand dictated. It was for this reason that, finally, in 1808, the Government took the first tentative steps towards establishing a permanent Government-based gun making facility, which eventually became the Royal Manufactory at Enfield Lock. It was hoped that this facility would provide a permanent cadre of highly skilled workmen who could swiftly train up the required additional workforce in emergency circumstances.

During our period, the Board of Ordnance, having established a system of manufacture which, given the constraints imposed by the financial limitations originating in annual Parliamentary grants, managed to gain and maintain sufficient control over the civilian guntrade which had to form its focal point, to enable it to produce a wide variety of small arms for all of the armed forces to a higher-than-normal standard of workmanship and finish, and (from 1755) to closely gauged patterns for all the components. As it was understood at the time, in a pre-Industrial Revolution non-factory complex, a high degree of standardisation was achieved in the manufacture of the mainstream weapon- the infantry musket- and in certain major components for other basic arms such as the barrels and locks for carbines and pistols. That other European nations achieved an even

higher standard was due to their having more centralised and authoritarian forms of government, and a much greater perceived military awareness with the budgets to back up that awareness.

From 1714 to 1783 the Board of Ordnance produced, within the framework of what we now identify as the Ordnance System, a total of 998,162 small arms. Of these 643,201 were Land Service muskets, 148,544 were Sea Service muskets, 53,459 carbines, 2000 musketoons and wall pieces, 1100 rifles and 149,858 pistols (counted singly). These figures do not include foreign purchases (at least 175,000) or captured arms, which would have added substantially to the number of arms available for issue. Taking as many factors into consideration as can be accounted for in the records, this seems to be a very high level of achievement for a pre-Industrial Revolution manufacturing complex, one which suggests to the present writer that the Board of Ordnance acquitted itself extremely well of all its responsibilities in the supply of small arms during our period.

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APPENDIX 1A.

PRINCIPAL OFFICERS OF THE BOARD OF ORDNANCE 1714-1783

Masters General of the Ordnance

1714 - 1722	John, 1st Duke of Marlborough
1722 - 1725	William, 1st Earl of Cadogan
1725 - 1740	John, 2nd Duke of Argyll
1740 - 1742	John, 2nd Duke of Montagu
1742	John, 2nd Duke of Argyll
1742 - 1749	John, 2nd Duke of Montagu
1755 - 1758	Charles, 3rd Duke of Marlborough
1759 - 1763	John, 1st Viscount Ligonier
1763 - 1770	John Manners, Marquis of Granby
1772 - 1782	George, 4th Viscount Townshend
1782 - 1795	Charles, 3rd Duke of Richmond

Lieutenants General of the Ordnance

1714 - 1718	Thomas Erle
1718	Thomas Nicklewaite
1718 - 1741	Sir Charles Wills
1742 - 1748	George Wade
1748 - 1757	Sir John Ligonier
1757 - 1759	Lord George Sackville
1759 - 1763	John Manners, Marquis of Granby
1763 - 1767	George, 4th Viscount Townshend
1767 - 1772	Henry Seymour Conway
1772 - 1782	Jeffrey, 1st Baron Amherst
1782 - 1804	William, 5th Viscount Howe

Surveyors General of the Ordnance

1714 - 1722	Michael Richards
1722 - 1742	John Armstrong
1742 - 1750	Thomas Lascelles
1750 - 1782	Sir Charles Frederick
1782 - 1783	Thomas Pelham

Clerks of the Ordnance

1714 - 1718	Edward Ashe
1718 - 1731	Thomas White
1731 - 1740	Leonard Smelt
1740 - 1772	William Rawlinson Earle
1772 - 1782	Sir Charles Cocks
1782 - 1783	Gibbs Crawfurd

Principal Storekeepers

1712 - 1717	Dixie Windsor
1717 - 1722	Sir John Weate
1722 - 1746	George Gregory
1746 - 1762	Andrew Wilkinson
1762 - 1765	Sir Edward Winnington
1765 - 1778	Andrew Wilkinson
1778 - 1780	Benjamin Langlois

1780 - 1782 Henry Strachey
1782 - 1783 John Aldridge

Clerks of the Deliveries

1714 - 1715 James Craggs
1715 - 1722 Thomas Frankland
1722 - 1733 Leonard Smelt
1733 - 1741 William Rawlinson Earle
1741 - 1746 Andrew Wilkinson
1746 - 1751 Charles Frederick
1751 - 1758 Job Staunton Charlton
1758 - 1772 Sir Charles Cocks
1772 - 1778 Benjamin Langlois
1778 - 1780 Henry Strachey
1780 - 1784 John Kenrick

APPENDIX 1B.

CONTRACTORS TO THE BOARD OF ORDNANCE 1715-1783.

The list which follows contains the names of one hundred and seventy-one contractors who supplied arms and/or major components of arms to the Board of Ordnance during our period. Examination of the list will show that the contractors fall into several clearly defined periods, generally coinciding with wartime years and their aftermath. Of the total number, eighty worked during the transitional years before the Ordnance system came into full operation in the late 1720s. For the purposes of this study, these may therefore be subtracted, leaving ninety-one firms. Of these forty-one were located in the Birmingham area and fifty in London. However when a further sixteen are subtracted from the London figure, and two from that for Birmingham, as being of very short duration and/or minor importance, a clearer balanced picture emerges, with some forty Birmingham and thirty-four London firms carrying out the bulk of the Ordnance small arms manufacture.

For most of our period the number of contractors required to execute the Board's work was fairly small. It was not until the 1790s and the wars against Revolutionary and Napoleonic France that the Board's requirements brought about a great enlargement of the number of contractors and, presumably, their workforces. Thus we find that, for the years from 1727 until 1756, the first clearly definable period, the supply of barrels was handled by four firms, locks by two additional firms and two of the barrel firms, furniture by one firm, rough stocking by one firm, and setting up by two firms until 1742 when there was a temporary increase of some seven firms for the duration of the war until 1749. The second clearly defined period occurred from 1756 until 1777, during which time the number of setters up was reduced effectively to one, with no important increase in the suppliers of barrels and locks. There are changes in firms, but not in the numbers of firms involved. In 1769

one firm is added to the number of rough stockers, making two, but until the importance of the American Rebellion was brought home to the Government in 1777, there was no overall increase in the setters up or component suppliers. The third period consists of the American Rebellion years, during which both the Wallers and Hirsts lost their virtual monopoly of, respectively, rough stocking and setting up to a new, though small group of London firms, and bayonet supply was extended to several Birmingham firms for the first time. The years between the end of the American Rebellion and the outbreak of the French Revolutionary wars saw the disappearance of almost all of the old names from the previous two periods, and the recognition of a tiny number of new names who subsequently merge into the greatly increased numbers which swell the system after 1793. The older divisions of labour broke down during the 1790s, with the same firms performing both rough stocking and setting up, many supplying their own brasswork (to Office pattern) and smallwork.

Whom amongst the many names listed below can be considered as the 'most important'? Speaking in terms of quantity in their several areas, there is no doubt that Waller, as the primary rough stocker, and Hollier as the supplier of furniture, Barber and Pickfatt as the two setters up, dominate the 1730-42 period. With Waller and Hollier continuing, a small group of setters up joined the force 'for the war' from 1742-9, of whom the most important was Birkell. From 1756, with Waller still dominating the rough stocking, the Loxhams replace Hollier for bayonets and Hartwell & Mayor for furniture, and Hirst becomes virtual monopolist setter up until 1763, with Farmer, Jordan, Oughton, and Grice, as the leading components suppliers. These firms remain unchanged until, in 1769 Loder joins Waller in rough stocking. From 1777 Hirst's position is eroded principally by John Pratt, and by a small number of setters up who supply chiefly Sea Service muskets.

NOTE: The years during which each contractor worked for the Board are shown as: ID 28 Mar. 1715 and FD 13 Jan. 1721. These represent 'intial date in Bill Book (or Treasurer's Ledger warrant date)' and 'final date of appearance in either of the above sources.'

A.

ALDRIDGE, George. London. ID 13 Sept 1705; FD 14 June 1716. Stocker and setter up from 1714.

B.

BARBER, James. London. ID 2 Mar. 1741; FD 4 May 1749. Setter up to the Board. Also supplied all of the carbines for Lord Loudoun's Regiment and the Duke of Cumberland's Dragoons.

BARBER, Lewis. London. ID Sept. 1722; FD 2 Mar. 1741. Setter up to the Board, one of the two major firms in this activity during his operational span, along with Charles Pickfatt. Also supplied some complete 'regimental' muskets.

BARKER, Matthias. Birmingham. ID 30 Sept 1775; FD 1783. Supplied barrels in partnership with John Whately. One of four contractors who supplied complete muzzle loading and breech loading Ferguson rifles to the Board in 1776.

BARNES, John. London. ID 18 June 1718; FD 19 Oct. 1719. Supplied complete arms.

BARRAS, Ralph. London. ID 19 Oct. 1719; FD 25 Mar. 1720. Supplied complete arms.

BATE, Edward. London. ID 31 Dec. 1779; FD 1783. Supplied complete Sea Service muskets, and set up a few other arms.

BIRKELL, William. London. ID 1 June 1742; FD 11 Apr. 1749. Important setter up to the Board.

BISSELL, Isaac. Birmingham. ID 12 Aug. 1779; FD 1783. Supplied barrels. Also supplied all-metal Highland pistols to regimental colonels' orders.

BLAKEMORE, Thomas. Wednesbury. ID 7 Apr. 1775; FD 1783. Supplied locks.

BRAZIER, John. London. ID 26 Feb. 1756; FD 1 Feb. 1757. Setter up.

BRAZIER, William. London. ID 12 Feb. 1714; FD 1716. Setter up.

BUMFORD, John. London. ID 26 Feb. 1756; FD 5 Jan. 1757. Setter up.

BUCKMASTER, Joseph. London. ID 26 Feb. 1756; FD 19 May 1757. Setter up.

BUCKMASTER, Robert. London. ID 8 May 1719; FD 7 Aug. 1719. Setter up.

BUCKMASTER, William. London.ID 5 Apr. 1720 only. Setter up.

BUNDAY, John. London. ID 13 Oct. 1688; FD 7 Nov. 1717. Setter up.

BURGIN, Mary. London. ID 9 Sept 1718; FD 30 Dec. 1727. Supplied brasswork. Widow of William.

BURGIN, William. London. ID 11 Jan. 1715; FD 2 Dec. 1715. Supplied brasswork.

C.

CARTER, Benjamin. London. ID 16 May 1718; FD 29 Mar. 1721. Setter up.

CLARKE, William. London. ID 8 Oct. 1739; FD 23 Oct. 1741. Supplied locks and barrels.

COLE, Elias. Birmingham. ID 8 Feb. 1715; FD 9 Mar. 1733. Supplied barrels, locks and bayonets.

COLLETT, Joseph. London. ID 18 Sept 1718; FD 26 Apr. 1720. Stocked and set up.

COOKES, Edward. Birmingham. ID 1 Apr. 1715; FD 3 Apr. 1739.

D.

DAVIDSON, Alexander. London. ID 31 Mar. 1782; FD 1785. Setter up.

DAVIS, Thompson. London. ID 30 June 1777; FD 1780. Setter up.

DAVIS, William. London. ID 2 June 1702; FD 19 Oct. 1719. Stocker and setter up.

DENNISON, John. London. ID 6 Mar. 1718; FD 9 Feb. 1720. Stocker and setter up.

DREW, John. London. ID 5 Apr. 1715; FD 19 Oct. 1719. Stocker and setter up.

DYER. Richard. London. ID 13 Oct. 1688; FD 15 Apr. 1715. Setter up.

E.

EBBUTT, Lancelot. London. ID 26 Sept 1704; FD 6 Apr. 1715. Setter up.

EDGE, Richard. Wednesbury. ID 3 June 1757; FD 20 May 1763. Edge & Son, 27 Feb. 1760; FD 11 Feb. 1774.

EVERARD, William. London. ID 16 Jan. 1718; FD 7 July 1719. Stocker and setter up.

F.

FALKNER & CO., Edward. Birmingham. ID 31 May 1778; FD 1779. Supplied locks, barrels and bayonets.

FARLOW, John. Birmingham. ID 18 May 1715; FD 15 Feb. 1736. Supplied locks.

FARMER, James. Birmingham. ID 13 Jan. 1741; FD 13 Jan. 1756. Supplied locks, barrels and some complete arms. Successor to his father Joseph.

FARMER, Joseph. Birmingham. ID 27 Jan. 1708; FD 23 Apr. 1741. Large-scale supplier of barrels and locks.

FARMER & GALTON. Birmingham. ID 13 Dec. 1757; FD 1774. Supplied locks and barrels. Partnership of James Farmer and Samuel Galton.

FITCHETT, William. London. ID 14 Aug. 1718 only. Setter up.

FORT, Mary. London. ID 8 Jan. 1709; FD 28 Mar. 1715. Setter up.

G.

GALTON, Samuel. Birmingham. ID 13 Jan. 1756; FD 23 Apr. 1757 (then see FARMER & GALTON). Again 21 Apr. 1775; FD post-1783. & Son from 1775 to 1797, then Samuel jun. Large-scale suppliers of locks and barrels; one of the four contractors for muzzle loading and Ferguson rifles in 1776; barrels, locks, bayonets and rammers from 1775.

GANDON, Peter (junior). London. ID 31 May 1743; FD 26 Feb. 1756. Setter up.

GILL, Thomas. Birmingham & London. ID 1778; FD post-1783. Supplied tools and bayonets.

GLUVIAS, Hewit. London. ID 13 Sept. 1743; FD 21 Feb. 1744. Stocker and setter up.

GOFF, Daniel. London. ID 13 Mar. 1782; FD 1785. Setter up.

GOODBY, James. London. ID 16 Dec. 1701; FD 14 June 1716. Setter up.

GREEN, Thomas. London. ID 8 Mar. 1697; FD 5 July 1728. Stocker and setter up.

GREEN, Thomas & Hezekiah. London. ID 1780; FD post-1783. Supplied locks and barrels.

GRICE, John & William. Birmingham. ID 20 Mar. 1742 only. Supplied complete pistols and carbines, one contract.

GRICE, Joseph. Birmingham. Two men of this name, uncle and nephew. ID May 1762; FD post-1783. Supplied barrels and locks.

GRICE, William. Birmingham. ID 31 Dec. 1770; FD 1788. Supplied barrels, locks and rammers. One of the four contractors for muzzle loading and Ferguson rifles in 1776. Died 24 July 1790.

GRICE & EDGE. Birmingham. ID Jan. 1756; FD 1760. Supplied barrels and locks. Partnership of William Grice and Richard Edge.

GRICE & SON, William. Birmingham. ID 1761; William only from 1770 to 1782, then & Son to 1789. Supplied barrels, locks and rammers.

H.

HADLEY, Thomas. Birmingham. ID 10 May 1776; FD 1781. Supplied barrels, locks, bayonets and rammers.

HADLEY, Henry. London. ID 18 Mar. 1756 only. Setter up.

HALFHIDE, George. London. ID 19 Jan. 1719; FD 21 June 1720. Setter up.

HALL, John. London. ID 1 Jan 1706; FD 26 Apr. 1720. Stocker and setter up from 1714.

HALL, Joseph. London. ID 26 Feb. 1756; FD 10 July 1756. Setter up.

HARRIS, Joseph. Birmingham. ID 6 Apr. 1756; FD 14 July 1762. Supplied barrels and locks.

HARRIS & BARKER (BARKER & HARRIS). Birmingham. ID 9 Jan. 1762; FD 1775. Supplied barrels. Partnership of Joseph Harris and Matthias Barker.

HARRISON, John. London. ID 30 Sept 1778; FD Apr. 1779. Supplied complete arms.

HARRISON & THOMPSON. London. ID 30 Oct. 1779; FD post-1783. Supplied barrels, locks and complete arms, also rough stocked and set up. Partnership of Penelope Harrison (widow of John) and James Thompson.

HARTWELL & HASKINS. Birmingham. ID 21 Apr. 1775 only. Supplied locks. Winding-up partnership of widow Abigail Haskins (widow of George) and Thomas Hartwell.

HARTWELL & MAYOR. London. ID Sept 1754; FD Apr. 1761. Supplied gun furniture. Partnership of Joseph Hartwell and Thomas Mayor. Mayor continues after Hartwell's death.

HASKINS, George. Birmingham. ID 19 Feb. 1757; FD 20 Sept 1758; then partnership with George Vernon to Apr. 1767, then reverts to his own name to death in 1775. Supplied locks.

HASKINS & VERNON. Birmingham. ID 2 Feb. 1759; FD 1767. Supplied locks.

HAWKINS, John. London. ID 13 Oct. 1688; FD 1716. Stocker and setter up from 1714.

HAYNES, James. London. ID 1 Jan. 1706; FD 1715. Stocker and setter up from 1714.

HEASLER, William. London. ID 19 July 1692; FD 9 June 1717. Stocker and setter up from 1714.

HENSHAW, Thomas. London. ID 26 Feb. 1756; FD 19 Aug. 1756. Setter up.

HIRST, James. London. ID 30 June 1777; FD 1784. Setter up. Partner of and successor to his father John.

HIRST, John. London. ID 22 Oct. 1745; FD 1777. Setter up, with virtual monopoly 1757-75. Took son James into partnership 15 Apr. 1774. Repaired large quantities of barrels and refurbishing of arms.

HOLDEN, William. Birmingham. ID 27 Jan. 1776; FD post-1783. Supplied barrels.

HOLLIER, Thomas. Lewisham, Kent. ID 18 Apr. 1716; FD 3 May 1748. Died 1754. Leaseholder of the Armoury Mills. Supplied iron and brass gun furniture, on a virtual monopoly basis from 1728 to 1748; also bayonets, swords, hangers and polearms, as well as refurbishing work.

HORNBUCKLE, Richard. Lewisham, Kent. ID May 1756; FD 1784. Leaseholder of the Armoury Mills, took over after Hollier's death. Mostly re-furbishing work, some bayonets during American Rebellion.

HOW, Richard. Lonodn. ID 18 Mar. 1756; FD 4 July 1758. Setter up.

HUGGINS, William. Birmingham. ID Apr. 1704; FD 16 May 1730. Supplied iron and brass gun furniture, locks, and bayonets.

HUMPHRYS (HUMPHRIES), Veritas. London. ID 16 May 1778; FD 1781. Setter up.

HUNT, Joseph. London. ID 18 Dec. 1778; FD 1781. Setter up.

J.

JOHNSON, Christopher. London. ID 5 Feb. 1708; FD 1716. Stocker and setter up from 1714.

JOHNSON, Margaret. London. ID 7 Oct. 1717; FD 1 Mar. 1729. Setter up.

JOHNSON, John. London. ID 26 Mar. 1696; FD 29 Mar. 1720. Stocker and setter up.

JORDAN, Edward. Birmingham. ID 18 Feb. 1733; FD 5 Apr. 1757. Large-scale supplier of barrels and locks.

JORDAN, Thomas. Birmingham. ID 6 Apr. 1744; FD 14 July 1762. Supplied barrels, locks, rammers and bayonets.

JORDAN & FARMER. Birmingham. ID 6 Nov. 1742; FD 1747. Supplied barrels, locks, and complete arms. Partnership of Edward Jordan and James Farmer.

K.

KELSO, Isaac. London. ID 23 Jan. 1756; FD 7 June 1757. Rough stocker.

KIPLING, Charles. London. ID 29 July 1690; FD 14 Apr. 1715. Stocker and setter up from 1714.

KIRKHAM, Henry. London. ID 14 June 1716; FD 6 Apr. 1728. Stocker and setter up.

L.

LEONARD, John. Birmingham. ID Nov. 1780; FD 1782. Supplied locks.

LLOYD, Evan. London. ID 1716; FD 6 Apr. 1728. Setter up.

LOADER, Edward. London. ID 5 June 1711; FD 17 Mar. 1715. Stocker and setter up from 1714.

LOADER, Mary. London. ID 15 Nov. 1716; FD 19 Jan. 1720. Stocker and setter up. Widow of Edward.

LOADER (LODER), Joseph. London. ID Mar. 1769; FD 1787. Rough stocker. One of the two main rough stockers during this period.

LOADER, Richard. London. ID 29 June 1689; FD 27 Apr. 1715. Stocker and setter up from 1714.

LOOKER, Robert. London. ID 13 Oct. 1688; FD 30 Aug. 1717. Stocker and setter up from 1714.

LOXHAM, William & Edward. London. ID July 1754; FD July 1780. Uncle and nephew partnership, sword cutlers. Had virtual monopoly of bayonet supply until 1778.

M.

MAYO, John. London. ID 16 Dec. 1701; FD 19 May 1715. Supplied locks and did Sea Service refurbishing work.

MAYOR, Jane. London. ID 1768; FD post-1783. Supplied gun furniture. Succeeded husband Thomas.

MAYOR, Thomas. London. ID Apr. 1761; FD 1768. Supplied gun furniture, originally partner with Joseph Hartwell. Succeeded by widow Jane.

MEMORY, Michael. London. ID 26 Feb. 1756; FD 14 Mar. 1758. Setter up. Returned 31 Oct. 1778; FD post-1783. Rough stocked and set up, complete Sea Service muskets.

MOORE, Daniel. London. ID 31 Aug. 1778; FD 1780. Supplied complete Sea Service muskets and a small number of Short Land muskets.

MOORE, William. London. ID 9 Sept 1689; FD 13 Nov. 1719. Stocker and setter up from 1714.

MORRIS, Isaac. London. ID 16 Sept 1701; FD 13 Nov. 1719. Stocker and setter up.

N.

NOCK, Henry. London. ID 30 Sept 1775; FD post-1783. Supplied locks, especially Extra Flat carbine locks, and seven-barrelled guns.

NUTT, William. London. ID 29 June 1689; FD 1715. Stocker and setter up from 1714.

O.

OUGHTON, Joseph. Birmingham. ID 25 Mar. 1755; FD 1759; & Son 9 Mar. 1759; FD 1776; Joseph only (son) 29 June

1776; FD post-1783. Large-scale supplier of barrels and some locks.

P.

PEDDELL (PEDDALL), James. London. ID 13 Oct. 1688; FD 1717. Stocker and setter up from 1714.

PERRY, William. Birmingham. ID 14 Aug. 1756; FD 25 Mar. 1757. Supplied locks.

PHILLIPS, Francis. London. ID 17 Apr. 1689; FD 16 Mar. 1720. Stocker and setter up from 1714.

PHILLIPS, Thomas. London ID 6 Apr. 1708; FD 14 Mar. 1723. Stocker and setter up from 1714.

PICKFATT, Charles. London. ID 13 Feb. 1727; FD 14 Dec. 1756. Setter up. With Lewis Barber, the chief setter up from 1730 to 1742.

PICKFATT, Humphrey senior. London. ID 13 Oct. 1688; FD 7 Aug. 1719. Stocker and setter up from 1714.

POWELL, Hugh. London. ID 16 Feb. 1716; FD 11 Jan. 1720. Rough stocker.

POWELL, Richard. London. ID 7 July 1719 only. Rough stocker.

PRATT, John. London. ID 28 Feb. 1777; FD 1781. Rough stocker and setter up, some complete arms and barrels. Designed a flared-mouth second rammer pipe adopted as standard in 1778-9. The most important single contractor during the 1777-81 period.

PREDDEN, William. London. ID 28 Feb. 1691; FD 25 Mar. 1720. Stocker and setter up from 1714.

PRESS, Joan. London. ID 2 May 1719; FD 19 Oct. 1719. Stocker and setter up.

PRINGLE, John. London. ID 1715; FD 12 Apr. 1720. Stocker and setter up.

PROBIN, Thomas. London. ID 2 Mar. 1708 only; then again 7 Nov. 1717; then again one order 1 Nov. 1727. Supplied complete arms.

R.

ROSE, William. London. ID 14 Jan. 1706; FD 19 Oct. 1719. Stocker and setter up from 1714.

S.

SALE, Edward. London. ID 6 Apr. 1715; FD 7 Aug. 1716. Stocker and setter up.

SALE, Edward. London. ID 15 Mar. 1743; FD 11 Apr. 1749. Setter up.

SAUNDERS, Thomas. London. ID 13 Oct. 1688; FD 16 Feb. 1715. Stocker and setter up from 1714.

SHARP, Richard. London. ID 1 Nov. 1743; FD ? Gun engraver to Board.

SHARP, William. London. ID July 1754; FD post-1783. Gun engraver to Board, also supplied smallwork and steel rammers. Took son William as partner in Dec. 1781.

SIBTHORPE, Robert. London. ID 25 Mar. 1706; FD 1717. Stocker and setter up from 1714.

SIMPSON, William. London. ID 24 Feb. 1718; FD 16 Mar. 1720. Stocker and setter up.

SINCKLER, Richard. London. ID 15 Sept 1714; FD 13 Apr. 1728. Stocker and setter up. Complete regimental arms 1727-8.

SMART, Francis. London. ID 30 Apr. 1695; FD 3 May 1720. Stocker and setter up from 1714.

SMART, John. London. ID 30 Oct. 1719; FD 3 May 1720. Stocker and setter up.

SMITH, John. Birmingham. ID 15 Feb. 1736; FD 27 Oct. 1747. Supplied locks and lock forgings.

SMITHETT, Dorothy. London. ID 21 Mar. 1718; FD 19 Jan. 1720. Stocker and setter up.

SMITHETT, George. London. ID 11 Sept 1703; FD 7 Nov. 1717. Stocker and setter up from 1714.

SMITHETT, George junior. London. ID 31 July 1717; FD 19 Oct. 1719. Stocker and setter up.

SOWERBY, Joseph. London. ID 1716; FD 18 Aug. 1719. Stocker and setter up.

SOWERBY, William. London. ID 5 Feb. 1708; FD 8 June 1728. Stocker and setter up from 1714.

STRINGER, Elizabeth. London. ID 15 Sept 1714; FD 7 May 1715. Stocker and setter up.

T.

TAYLOR, John. London. ID 16 Apr. 1747; FD 2 Nov. 1748. Setter up.

TIPPING & EDGE. Birmingham. ID 17 Feb. 1746; FD 27 Oct. 1747. Supplied locks and barrels.

TITTENSOR, John. Birmingham. ID 8 Nov. 1707; FD 31 July 1717. Supplied barrels; from 1714 also stocker and setter up.

TOMKYS & SHORT. Birmingham. ID 2 Feb. 1759; FD 1769. Supplied barrels and locks, originally as executors of John Willets.

TOUGH, Mary. London. ID 31 Dec. 1694; FD 27 Feb. 1716. Stocker and setter up from 1714.

TOUGH, Robert. London. ID 22 Feb. 1705; FD 16 Feb. 1720. Stocker and setter up from 1714.

TOWLE, Elizabeth. London. ID 25 Feb. 1693; FD 24 Sept 1715. Stocker and setter up from 1714.

TOWLE, Thomas. London. ID 11 Sept 1703; FD 29 Mar. 1720. Stocker and setter up from 1714.

TRESTED, Richard. London. ID 31 Dec. 1777; FD 1786. Rough stocker.

TREVEY, Nathaniel. London. ID 17 May 1743; FD 11 Apr. 1749. Setter up.

TUCKER, Thomas. London. ID 20 Nov. 1777; FD 1785. Rough stocker.

TURVEY, Edward. London. ID 24 Sept 1692; FD 6 May 1715. Stocker and setter up from 1714.

TURVEY, William. London. ID 19 Oct. 1719 only. Setter up.

TYLOR (TYLER), Thomas. London. ID 27 Oct. 1688; FD 6 Apr. 1715. Stocker and setter up from 1714.

V.

VAUGHAN, John. London. ID 25 May 1706; FD 12 June 1747. Large-scale supplier of barrels and locks, some complete arms, setter up. Chiefly lock supplier.

VERNON, George. Birmingham. ID 19 Feb. 1757; FD 20 Sept 1758. Supplied locks. Subsequently in partnership with George Haskins, as Haskins & Vernon.

W.

WALLER, James. London. ID May 1767; FD 1781. Rough stocker. In partnership with father Richard 1755-67, took over business 1767, shared rough stocking with Joseph Loder from 1769.

WALLER, Richard. London. ID 29 July 1718; FD 1767. Gunstock maker and wood supplier. Rough Stocker. In partnership with son James 1755-67. Enjoyed monopoly of rough stocking for the Board from ca. 1730 to 1756, and virtual monopoly until his death.

WARD, Richard. London. ID 16 Jan. 1718; FD 7 July 1719. Stocker and setter up.

WELFORD, Richard. London. ID 15 Sept 1714; FD 26 Apr. 1720. Stocker and setter up.

WESTON, Edward. London. ID 28 Nov. 1699; FD 1717. Stocker and setter up from 1714.

WHATELY (WHATELEY), John. Birmingham. ID 28 Oct. 1756; FD 1776. & Son 13 Dec. 1757. John only (son) 31 Dec. 1776; FD 1786. Again 1793; FD 1804, partnership with Henry. Large-scale supplier of barrels, locks and rammers.

WHITE, John. London. ID 14 June 1716; FD 3 June 1720. Stocker and setter up.

WHITE, Thomas. London. ID 2 June 1702; FD 1716. Stocker and setter up from 1714.

WILLETTS (WILLETS, WILLET). Benjamin. ID Apr. 1769; FD 1783. Supplied barrels and locks, and muzzle loading and Ferguson rifles in 1776.

WILLET(S), John. Birmingham. ID 23 Nov. 1742; FD 23 Apr. 1757. Supplied barrels and locks. Executors were Tomkys & Short.

WILLIAMS, John. London. ID 16 Dec. 1701; FD 16 Feb. 1720. Stocker and setter up from 1714.

WILLOWES, John. London. ID 22 Feb. 1705; FD 7 July 1719. Stocker and setter up from 1714.

WILSON, Richard. London. ID 15 Apr. 1746; FD 27 Aug. 1761. Setter up, also supplied barrels and locks.

WILSON, William. London. ID 24 Jan. 1777; FD 1782. Setter up, also some barrels and locks. Son of Richard.

WINESOP, John. London. ID 26 Mar. 1696; FD 1717. Stocker and setter up from 1714.

WOOD, John. Birmingham. ID 19 Feb. 1747; FD 10 Feb. 1757. Supplied locks.

WOODELL, George. London. ID 7 July 1719 only. Rough stocker.

WRIGHT, Thomas. London. ID 13 Oct. 1688; FD 15 Sept 1714.
Stocker and setter up from 1714.

APPENDIX 2

FROM KING'S STORES TO REGIMENTAL RACKING: THE ISSUE OF SMALL ARMS

The final stage in the supply of small arms to the British armed forces was to get them from the King's Stores (either in the Tower of London or at various Out Ports and other depots throughout the kingdom) into the hands of the soldiers and sailors who would use them. As with all other aspects of the process of supply, the issuing of arms was much hedged about with paperwork; but, fortunately, much of this has survived in comparison with some of the other areas, and we are able to see with better than average clarity just how the mechanism for issuing arms actually functioned.

The ultimate objective of the operation was not, as one might expect, the expeditious delivery of arms into the hands of those needing them but, rather, what the Twentieth Century calls 'accountability.' At every step, as with a Recorded Delivery letter, someone had to accept responsibility in writing, for the movement of King's Property from its safe haven in the Stores into the utterly unsafe and vulnerable hands of the King's front-line servants.

As far back as 1686 the precedent had been established which was to guide the minions of the Ordnance in their protection of the King's property from abuses outside their immediate control. The King's Warrant to the then Master General of the Ordnance lays bare the structure which applied throughout and beyond our period:

JAMES R.

> Whereas Our Right Trusty and welbeloved Councillor George Lord Dartmouth, Master General of Our Ordnance, has by Our Order compleatly furnished with new Arms Our several Regiments, Troops and Companys of Horse, Foot, and Dragoons, We have thought fit hereby to signify Our Will and Pleasure, That all Colonels, Captains, and Commanders, in Chief of any of Our said

> Regiments, Troops, and Companys, do give strict Charge to the Soldiers under their Command, that they take Care to preserve and keep in good Order, and repair, all such Arms as are already or shall be deliver'd to them; We further declaring hereby that all Captains shall be accountable unto Us for any Arms that shall be lost, embezzled or Spoiled by the Soldiers under their respective Commands; And that they are forthwith to provide New Arms at their own Charge, to supply all defects that shall happen in any Case whatsoever, except upon our Actual Service; And all Colonels, Captains, and Commanders in Chief of any of Our Forces, are to take Notice of this Our Royal Pleasure, and duly to conform themselves thereunto, Given at Our Court at Windsor, this 4th day of August, 1686, in the Second Year of Our Reign.
>
> By His Majesty's Command
> William Blathwayt[1]

An admirably clear, concise instruction, one easily circulated and straightforward to implement- one would think. One would, however, be completely wrong. No single function of the Ordnance over the ensuing century required more frequent reiteration, clarification, argument and correspondence with the army than this over-riding question of who was responsible for what, and under what precise circumstances. The chief difficulty was that the army was not a single unified body under a central administration, and although the first two Hannoverian monarchs took a great personal interest in their army and did much to reduce its administration to a unified central control, throughout our period and beyond the army retained its regimental focus to the detriment of logistic requirements and their administration. So far as the army was concerned, the Royal Warrant was reduced and re-stated as part of the all-powerful Articles of War, which bound every unit in the service. Section 13, Article 4 reads:

> That every Captain of a Troop or Company is charged with the Arms, Ammunition, Accoutrements, Cloathing or other Warlike Stores belonging to the Troop or Company under his Command, which he is to be accountable for to his Colonel, in case of their being Lost, Spoiled or Damaged not by Unavoidable Accidents or on Actual Service.[2]

Despite this clear statement of responsibility and accountability which every officer concerned must have seen fairly early in his career, every possible interpretation of the words 'Lost, Spoiled or Damaged not by Unavoidable Accidents' was put forward in an attempt to obtain new arms at the Crown's expense.

The organization of the British army was, and still is, based upon the basic unit of the regiment. Each regiment was run very much as a proprietary, personal entity by those into whose hands the King had given it. All attempts to introduce centralization and uniformity were rigorously evaded or ignored where-ever they conflicted with the views of regimental officers, particularly when a unit was stationed at any distance from the influence of the Adjutant General's Office and its inspectors. Regiments in Ireland, or on foreign service quickly developed individual styles of uniform, drill, administration, and in many cases small arms. This was partially due to poor supply procedures which meant that some locally available materials had to be made use of in default of those from the central authority, but also to the whims of the commanding officers. When a regiment returned to England the process of bringing it back into line with those regiments stationed at home had to begin almost as from the beginning, and indeed many regiments were ordered to leave their arms in the stores of the depot from which they were departing, and were issued with a new set upon returning to England. These were officially (and often actually) 'worn out on service' and therefore replaceable at Crown expense.

Even officials in other Government departments, and ministers, were accustomed to treating the regulations as

if they did not apply to themselves. Thus Lord Nottingham, Secretary of State, forwarding a demand for a set of spare arms for the British troops in Portugal, was informed by the Board in 1703

> concerning the arms demanded by the Duke We think it our Duty to represent to your Ldp that this Demand being altogether unusuall, may be of very ill Conse quence to her Majys Service by introducing a Custom of furnishing to all Regiments a quantity of Spare Arms, which will infinitely increase the Charge of this Office for whatever is allowed to one officer always grows a Precedent for another to ground his Pretensions and wee Submitt to your Ldp that whereas there never has been any Spare Arms allowed to the Army in Flanders if the Duke of Marlboro should make the same proportionable Demand as now is made for Portugal whether the Charge would be able to be com- plyed with, besides at this time being other great and necessary Demands for Armes. Wee hope no extra- ordinary Issues will be ordered wee not being in a Condition without an Extraordinary Supply of money for that purpose to fill up the Stores again as her Majestys Service will require.[3]

The Board lost this particular point, and, as they had predicted, the principle of a supply of spare arms for an army serving abroad was henceforth established, when funds were made available.

In general the needs of the service did tend to override the breaking of precedents so feared by the Ordnance, but there were generally two good sides to most of the arguments. The establishment of precedents counted for much in an era when so much of governmental business was conducted within the very loose limitations of vague, ill-defined regulations and personal interpretation and adaptation. The Ordnance therefore sought to protect all those which defined and clarified its role, and to destroy or nip in the bud any which threatened its own, particularly in cases where an argument for additional funds outside the annual Parliamentary grant would have to be put forward by the officers of the Board. Conversely, when the source of the funding was expressed and approved

at the time of the unprecedented demand, the Board complied with little opposition.

Having made it clear that the system about to be described was under constant assault by wilfully ignorant and/or independently minded officers and officials, we can now pass on to the system itself. There were several basic reasons why an issue of arms might be requested:

1. A regiment or other smaller unit (such as an Independent Company) was being raised and required a full set of arms for its Established numbers.

2. An already existing unit was being augmented, and the additional men required arms, preferably of the same pattern and dimensions (such as calibre and overall length) as those already in the hands of the 'old numbers' of the unit. There were many problems here for the Board, especially with regiments which had been in Ireland for any length of time, where they acquired arms from the Irish Board of Ordnance of different patterns to those issued by the English Board, often leaving a regiment with at least two distinct patterns and calibres of musket. This situation was usually resolved by the entire unit being re-armed with one pattern of new arm.

3. Through long use, training and maintenance (or lack of it), some portion of the arms in a unit became 'unfit for service' i.e. worn out, and required replacement. This was a major problem area for the Board: had the arms been abused and neglected, or were they legitimately worn out? If the former, the regiment must pay, if the latter, the Crown.

4. Losses in battle or in transit to or from a campaign had to be replaced.

5. Expeditionary forces being outfitted required a quantity of spare arms and ammunition in addition to those supplied to the men of each regiment. Such forces were often re-armed with new weapons at short notice.

6. Regiments ordered on foreign service in wartime were generally re-equipped with the newest arms available, all of a uniform pattern and calibre.

7. Garrisons in colonies (e.g. Gibraltar, Jamaica, Minorca, New York, South Carolina) periodically required a new set of arms to replace those long in store and usually neglected, or worn out in local campaigning or policing service. Colonial governments, as distinct from British garrisons in a colony, normally purchased their own militia arms, or put the burden on the individual militiaman; in either case the arms were normally of English origin to a military pattern similar to the current Ordnance pattern but less well made and finished.
8. Occasionally groups of new settlers being sent to some colony were given arms by Government to aid their establishment and survival in what was assumed to be a hostile environment.

The beginnings of the long road down which a request for the issue of arms must travel was succinctly described by John Boddington, long-time Secretary to the Board, in testimony before the Board of Commissioners of Public Accounts in 1784:

> The Orders under which the Board of Ordnance act are, Warrants from the King or Privy Council; and, in Sea Affairs, from the Admiralty; Letters from Secretaries of State, and Significations from the Master General.[4]

In the case of a newly raising regiment, the Master General would receive a warrant from the Principal Secretary of State, in the King's name, ordering the issue of a given number of arms based on the official number of men established for that regiment. A typical warrant for this type of issue would read:

GEORGE R [l.s.]

Whereas We have thought fit to Order a Regiment of Light Dragoons to be forthwith raised under the Command of Our Trusty & Welbeloved John Manners Esqr (commonly called Marquis of Granby) Lieutenant General of Our Forces, which is to Consist of Six Troops of Three Serjeants, Three Corporals, Two Drummers and Sixty Private Men in each Troop besides Commission Officers; Our Will and Pleasure is, that out of the Stores remaining within the Office of Our Ordnance, under your Charge, you cause Four hundred & eight

Pair of Pistols, Three hundred and ninety six Carbines, Three hundred & ninety six Cartouch Boxes, and Twelve Drums, to be issued and delivered to the said John Manners Esqr (commonly called Marquis of Granby) or whom He shall appoint to receive the same, taking his Indent as usual; And you are to Insert the Expence thereof into your next Estimate to be laid before Parliament and for so doing, This shall be, as well to you as to all other Our Officers and Ministers herein concerned, a sufficient Warrant.
Given at Our Court at St. James's the sixteenth day of April 1760 in the Thirty Third year of Our Reign
By His Majesty's Command
W. Pitt [l.s.]

To Our Trusty and Welbeloved
Cousin and Councillor John Viscount
Ligonier, Master General of Our Ordnance.[5]

All the elements called for by the Board are here: the number and types of arms required, specific reference to the responsible officer (Granby) giving a receipt for the keeping the arms in good order and taking responsibility for them, and the assigning the debt to the next Parliamentary estimate of expenses. At this point, if the required numbers and type of arms of arms were not in store, the manufacturing process described in the text would be initiated by the Board. The warrant does not mention that the type of arm might be something particular, which would have to be newly made- as in this particular instance it was, for Granby's new regiment was the Royal Forresters, and he wanted a special carbine and pistol made for it, which, given his position and influence, he obtained. The above warrant, dated 16 April, was endorsed as received on 2 May, and ordered into effect by the Board on 3 May; in itself this was not an unusual time span, but since the arms had to be specially made, the unit did not receive its arms until later in the year. This is one of the major pitfalls when relying upon a warrant to determine when a regiment actually received its arms; the other is that the arms called for in the warrant are sometimes changed, substitutions being made by the Board in the interests of time and/or expense.

Having received the initial authority for action, the

Master General would pass on the relevant facts to

> ...the Clerk of the Ordnance generally, or if he is absent, some other Board Officer, [who] endorses upon the Requisition [in this case a King's Warrant] an Order for the Supply; this Order is sent to the Principal Storekeeper, for him to see whether he can comply with it; he transmits it to the Clerk of the Deliveries, that he may draw a Proportion, which is an Instrument that contains a Specification of the Stores to be issued, the Place to which they are to be issued, and the Date of the Order of the Board: This Proportion is signed by any Three Board Officers, entered in the Proportion Book in this [i.e. the Clerk of the Deliveries'] Office, and then delivered to the Storekeeper, as his Warrant for the Issue. The Issuing Clerk... having entered in the Issuing Book the Articles contained in the Proportion, carries that book to the Storekeeper and receives those Articles from him, sees them packed, sends them away, and takes a Receipt from the Person instructed to convey them; which Receipt is kept by the Clerk of the Deliveries, as his Voucher. Upon the Delivery of Arms or Ammunition, the Voucher taken from the Person who receives them is an Indenture, by which he undertakes to be accountable for the Arms he receives, and he certifies that they are good and sufficient.[6]

This extraordinarily detailed description of each of the steps taken within the Office for the issue of arms requires little clarification: modifications to the general procedure occurred mainly at the source of the request, as shown in the list of reasons for issue. Unfortunately, most of the lesser paperwork is no longer extant, having been officially 'weeded' over the years by subsequent generations of office workers. There are, however, a number of Proportions surviving, and these play at times a crucial role in our understanding of who received what arms, since they normally contain more descriptive and technical details than the warrants.

There also survive a small number of Indentures for the receipt of arms, which are printed forms with particulars written in (underlined portions in the example quoted below). The following Indenture is of particular

interest as it shows the last instance of muskets with iron furniture being issued to the Guards as late as 1739:

> THIS INDENTURE made the Thirty First day of July 1739 and in the Thirteenth Year of the Reign of our Sovereign Lord, George 2d by the Grace of God, King of Great Britain, France and Ireland, Defender of the Faith, &c. Between His Grace John Duke of Argyll and Greenwich Master General of His Majesty's Ordnance, and the Principal Officers of the same, for and on behalf of His said Majesty, on the one Part; And The Rt Honble the Earl of Scarborough on the other Part; Witnesseth, That the said Earl of Scarborough doth acknowledge by these Presents, by Virtue of His Majesty's Warrant bearing date the 2d, and by Order of the Board dated 17th Instant to have had and received the several sorts of good, well fixed and serviceable Arms and Habiliaments of War, hereunder specified. For all which Arms and Habiliaments of War, the said Earl of Scarborough doth hereby undertake to be accomptable, and to maintain and continue the very same Arms in good repair; and to return and deliver the very same Arms up into His Majesty's said Magazine, fixed and serviceable, when he shall be thereunto required (the hazard of the War only excepted.) And that in case any of the said Arms be lost, by Negligence, or by any other Default, that then the said Earl of Scarborough shall and will buy so many good Arms out of His Majesty's Magazine, as shall re-supply the Arms so lost, at the Rates usually paid by His Majesty for the like Arms. being to Arm the Additional Men to the Cold Stream Regiment of Foot Guards, under his Lordship's command.
>
> Land Service Musquets with Iron Furniture and Steel Rammers 198
> Bayonets for do. 198
>
> Hedworth Lambton for the Earl of Scarborough[7]

A hand-written certificate is pinned to the above Indenture which completes the story:

> I do hereby Appoint Lt. Coll. Hedworth Lambton Quarter Master, to receive and Indent for the 198 Musquets with Bayonets for the Additional Men to His Majesty's Coldstream Regiment of Foot Guards under my Command. Pursuant to His Majesty's Warrant bearing

Date the 2d of July 1739.

Scarborough

It should be noted that replacement arms, in the event of loss by negligence, were to be purchased from H.M. stores, and at the going rate: 'regimental' muskets were not allowed.

In cases where arms were to be issued to regiments or other units already in existence, the initiative came from the company officers of the unit, who would report a number of arms lost or defective beyond the scope of local repair. These deficiencies could be discovered through a local formal inspection, or by report from the con-commissioned officers to their company commander. The colonel, or his appointee, would then address the Secretary at War, who would in turn write to the Principal Secretary of State, as did Henry Fox:

War Office

11 march 1752

My Lord

It having been Certify'd that the undermention'd arms &c. are wanting for the Use of Lieut. General Wolfe's Regiment of Foot, to replace the like Number worn out and unfit for Service; I have the Honour to acquaint Your Lordship therewith, that Yor Lordship may be pleas'd to receive His Majesty's Commands thereupon, and signify the same to the Lieutenant General & Principal officers of the Ordnance, that the said undermention'd arms may be deliver'd out of His Majesty's Stores, and the Expence thereof charg'd to the Estimate of Ordnance for Parliament, and the old Arms receiv'd into the Stores.

I am, with the greatest Respects, My Lord, Your Lordship's most obedient and Most Humble Servant,

Henry Fox [l.s.]

30 Halberts
20 Drums
730 Firelocks & Bayonets
730 Cartouch Boxes, with Strops, and Frogs.

Earl of Holdernesse
His Majesty's Principal
Secretary of State [8]

The above request refers to the complete re-arming of a

regiment. Whenever existing arms were to be replaced, for whatever reason, the old arms in the hands of the troops were to be returned into the King's stores at the same time that the new arms were issued. The only exception to this general rule was in the case of regiments on foreign service who were returning to England. In many instances their arms were ordered into the local Ordnance depot, and the costs and wear of bringing home old arms was saved, when it was known that a regiment would have to be re-armed on its arrival in England.

Battle losses were covered by similar warrants, but omitted the stricture to return the old arms. A typical note of a group warrant for battle loss replacement arms appears in the Ordnance Minutes for 6-7 April 1759:

> Received His Majesty's Warrant dated the 16th Ultimo directing arms &c to be Issued for use of the several Troops and Regiments mentioned in a List therein inclosed, Vizt:
>
> 1 The King's Regiment of Dragoons
> 1 Royal Regiment of Dragoons
> 2 Royal North British Dragoons
> 3 King's Own Regiment
> 6 Inniskilling Dragoons
> 7 Queen's Dragoons
> 10th Regiment of Do.
> 11th Regiment of Dragoons
> Coldstream Regiments of Foot Guards, 1st Battalion
> 3 Regiment of Foot Guards 1st Battalion
> 5th, 24th, 30th, 33d, 34th, 36th, 67th, 68th and 72d Regiment of Foot
>
> to replace the like Number lost and rendered Unserviceable in the Expeditions on the Coast of France, the same to be delivered to the Colonels of the Respective Regiments or to such Persons as they shall appoint to receive the same taking their Indents as usual, ...[9]

Warrants for battle loss replacements were often issued long after the arms themselves had been put in the hands of the troops; this merely clarifys the role of the warrant as establishing who was paying for the arms, not the question of entitlement to the arms.

Very occasionally a few details of the arms to be issued are contained in the warrants, especially when a

new type of arm is being introduced, or it is a relatively new pattern, or there is a choice of arm requiring some clarification. In the explanatory warrant quoted below the details were necessary because the pistols in question (originally made for the Royal Forresters) had not been made for at least fifteen years; and, as so often happened, the office people were not sufficiently aware of technical features to write them into the original warrant.

GEORGE R. [l.s.]

Whereas it has been humbly desired that the one hundred and thirty six pairs of Pistols which we were pleased by Our Warrant bearing date the 29th of November last, to direct should be issued and delivered for the Use of Our first Troop of Horse Grenadier Guards to replace a like number borken and unfit for Service, may be of the Pattern hereafter specified, OUR WILL AND PLEASURE is that out of Our Stores remaining within the Office of Our Ordnance under your charge, you cause the said Pistols agreeable to the said Pattern to be forthwith issued and delivered to such Person or Persons as shall be duly authorized to receive them ...15th day of April 1776. ...

Dimensions of the Pistols wanted for the 1st Troop of Horse Grenadier Guards, Calibre 6/8 of an In, length of the Barrel 10 Ins, whole length including the Stock 16 Ins. Commonly Call'd Carbine Pistols.[10]

The pistols were actually referred to as 10-inch carbine-bore pistols in the Ordnance records.

When time was of the essence, and large numbers of troops whose arms required replacing were bieng moved from one point to another, the system sometimes suffered temporary modifications. When, in 1776, a number of regiments were being sent directly from their Irish garrison areas to North America, it was found advisable ro re-arm them through the facilities of the Irish Board of Ordnance in Dublin. The Master General was informed by Lord Weymouth, Secretary of State:[11]

St James's 9th Janry 1776

My Lord

It being expedient that Arms, Drums &c. should be furnish'd at the Expence of Great Britain for the

augmentation to the 3d, 9th, 11th, 19th, 20th, 24th, 30th, 33d, 34th, 53d, 54th, 57th, 62d & 67th Regimts of Foot in Ireland, and it appearing that it would be more for the Benefit of His Majesty's Service if the said Arms, Drums &c, should be made up in Ireland, and the Expence thereof defrayed from hence, I am to signify to your Lordship His Majesty's pleasure, that the Expence thereof be repaid by the Board of Ordnance to Ireland, according to the annexed Estimate, and the amount thereof charged to the Estimate of Ordnance for Parliament [marginal note: Estim 1777]

I am to add that His Majesty's Pleasure has been signified to the Lord Lieut. of Ireland that the necessary Orders be given there for carrying into Execution this Service accordingly.

I am My Lord Your Lordships most obedient humble Servt

Weymouth

State of the Charge for furnishing Arms &c for Augmentn to 14 Battns Foot.

2 Serjeants Fuzils	ea.	£1.15	£ 3.10.-
8 Halberts	ea.	11.4½	4.11.-
10 Drums and Cases	ea.	2. 7½	20. 6.3.
160 Firelocks and Bayonets	ea.	1.15.	280.
Total charge for one Battn			308. 7.3.

Which for 14 Battalions amounts to £4,317.1.6.

Once the warrants had been acted upon and it had been determined that the required arms were available from stores, the final operation prior to packing up the arms in arms chests containing twenty-five muskets each, was to have the markings of the units to which the arms were being issued engraved on each arm. This engraving was carried out by one, or at times two, firms, their men working in the Tower workshops. The name or number of the regiment was engraved along the top of the barrel; the company and rack number within the company (usually separated by a horizontal line) was engraved on the thumb piece; these two numbers were repeated on the shank of the rammer on steel rammered arms, just below the button-head of the rod; the socket of the bayonet was also engraved with the company and rack numbers, and sometimes with the regiment number as well. On arms lacking the thumbpiece, the company was sometimes included in the barrel markings,

or else engraved with the rack number on the tang of the buttplate. The numbering was done according to the Establishment of a particular regiment, not by the number of men actually in the various companies. On pistols lacking thumb pieces the troop and rack number was frequently engraved on the trigger guard bow. The records suggest that all arms issued to regularly established units were engraved (not stamped) in this manner throughout our period and beyond. Those arms shipped in bulk as spares for troops on foreign service, for issue at the discretion of the local area commander, were not engraved. Old arms returned into store which were in good condition had their marks removed by the Small Gun Office workmen, and if appropriate, re-engraved by the Office engravers when next issued. This removal of out-of-date markings was a standard part of the re-furbishing work carried out on all arms returned from regiments which were not considered likely to be re-issued to that same regiment in the foreseeable future. Although there is no specific evidence to support the assertion, it appears that large Ordnance depots, like Gibraltar or New York, may have had engravers amongst their workforce who would locally engrave arms being issued to regular units in their area; there are numbers of arms with non-standard but obviously old engraving on them whose markings may have originated in this manner. Sea Service muskets were not engraved, although many pistols have been noted with location markings engraved on the buttcaps. The survival of arms with markings to the present day is very unusual; these must have 'escaped' from Government service by a number of means, and not returned into store.

Once the arms were packed into arms chests, they were either taken down to Tower Wharf for loading into lighters and carrying out to ships waiting in the Thames, or loaded into smaller coastal vessels at the Wharf itself for transmission by sea to ports where transports were assembling. Still others would be loaded into waggons if time allowed, and sent overland to the regimental depot or

Out Port concerned. Sometimes regimental waggons would call at the Tower with the old arms and receive the new. But the onus seems generally to have been on the Ordnance to collect the old arms and deliver the new ones to those units stationed in reasonable travelling distance of London.

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Apart from the irregular replacement of arms worn out in service, or the equipping of newly raised regiments, there were three major re-armaments of virtually the entire British army during our period. The first of these occurred in 1740-41, following an inspection of the arms of many regiments stationed in England, and the outbreak of the largely maritime War of Jenkins' Ear, when it appeared that involvement on the Continent would not be long in coming. Many of the arms still in the hands of the regiments had been issued during the later years of the War of the Spanish Succession, or only slightly later, and large numbers were completely useless. At this time all these older arms, particularly those with iron furniture, and non-standard 'regimental' muskets were replaced by the Pattern 1739 brass mounted musket, most of which had double bridle locks. The second re-armament took place in 1756-7, at the beginning of the Seven Years' War, when those regiments serving in England or bound for service on the Continent, were re-equipped with Pattern 1756 muskets having steel rammers. Wooden rammered muskets were relegated to troops serving in colonial theatres, chiefly North America and India, and continued on arms such as Sea Service, the marines, and arms for mounted troops. The third and last major re-armament took place in the early and middle 1770s, following the introduction of the Pattern 1768 Short Land musket for all line regiments, and steel rammered carbines for the dragoons, artillery and serjeants. Much of the re-equipping was carried out when the regiments were sent to North America following the

outbreak of the rebellion in 1775. By this time the militia had converted its originally wooden rammered muskets to steel, and the marines were also equipped with steel rammered arms during this last period of re-armament. The Navy would have to await the gradual replacement of its wooden rammered arms as the result of service in the wars following 1793. The Guards regiments did not give up their Long Land muskets until after 1790, although they were amongst the first regiments to have their muskets altered for steel rammers in the early 1750s.

Footnotes to Appendix 2.

1. SP 41/36
2. WO 55/353, 1750.
3. Ibid., f. 154.
4. 12th Report of the Commissioners of Public Accounts in: House of Commons, Reports & Papers, v. 42 (London, 1784), Appendix 4, 44.
5. WO 55/248, 159-60.
6. House of Commons, op.cit., 59-60.
7. SP 41/36.
8. SP 41/19.
9. WO 47/53, 405.
10. WO 55/417.
11. Ibid.